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FINAL REPORT

PLANNING SUPPORT FOR MAINTENANCE AND OVERHAUL OF GUN WEAPON SYSTEMS

May 1981

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Prepared for
MANAGER, SURFACE WEAPONS SYSTEMS MAINTENANCE BRANCH
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND 20640
under Contract N00174-80-C-0438

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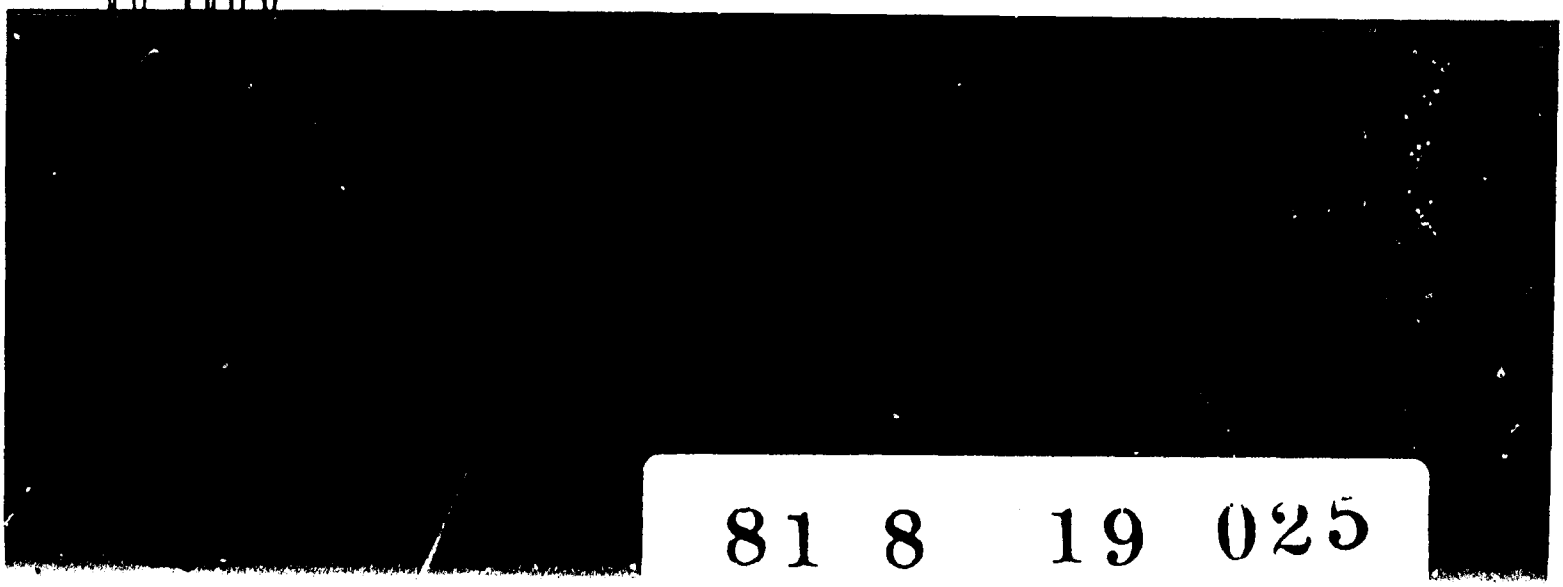

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This final report summarized the work performed by ARINC Research Corp. in support of the Manager of the Surface Weapons Systems Maintenance Branch, Indian Head, MD concerning shipboard installation of ordnance alterations for the 3"/50 Gun Weapon System Improvement Program.

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ABSTRACT

This final report summarizes the work performed by ARINC Research Corporation in support of the Manager of the Surface Weapons Systems Maintenance Branch, Naval Ordnance Station, Indian Head, Maryland, concerning shipboard installation of ordnance alterations for the 3"/50 Gun Weapon System Improvement Program. Management support was also provided for the Gun Weapon Systems Replacement Program (GWSRP) in the following areas:

- Determination of requirements for GWSRP lifting gear for existing waterfront facilities
- Automation of the transfer of data within the GWSRP Reporting System
- Development of a new report format for the semiannual GWSRP conference

Work was performed from 22 August 1980 to 21 May 1981 under Tasks 1 through 4 of Contract N00174-80-C-0438.

SUMMARY

This report presents the results of an effort to provide engineering and management support to the 3"/50 Gun Weapon System Improvement Program (GWSIP) and the Gun Weapon Systems Replacement Program (GWSRP). The study was performed under Contract N00174-80-C-0438 for the Surface Weapons Systems Maintenance Branch, Naval Ordnance Station, Indian Head (NAVORDSTA, I.H.), Maryland. In support of the study objectives, the following actions were taken:

(1) A study was conducted to determine requirements for waterfront facilities concerning GWSRP-related equipment lifting gear. Requirements were determined on the basis of current and future configurations for fleet gun weapon systems. This study also provided guidance in the form of support procedures to be followed concerning acquisition, maintenance, and control of the lifting gear.

(2) Assistance was provided in the effort to automate the transfer of data for Material Condition Reviews (MCRs). Hardware requirements of organizations participating in the collection and reporting of data for the GWSRP Reporting System were investigated, and support was provided to coordinate each organization's efforts in converting to automation to ensure overall system compatibility.

(3) A preliminary management plan was developed to provide guidance in the shipboard installation of GWSIP ordnance alteration (ORDALT) kits. This plan addresses the planning, scheduling, reporting, and coordination efforts involved in shipboard installation of ORDALT kits.

(4) Continuing engineering and management support was provided to NAVORDSTA, I.H. The primary objective of this effort was to investigate, review, and report developing requirements for overhaul of gun weapon systems.

Results of these actions led to the following conclusions:

- The capability of many waterfront facilities to remove and install GWSRP-related gun weapon systems can be enhanced by procurement of needed gun weapon system lifting gear and improvement of the controls on the maintenance and accountability of the lifting gear.

- Computer facilities at organizations participating in the transfer of data within the GWSRP Reporting System are generally compatible. It is feasible to add or to modify the facilities to support automation of MCR data-transmission operations.
- A structured management organization separate from the GWSIP ORDALT production effort is necessary to ensure timely completion of shipboard ORDALT kit installations. Scheduling and configuration control of the ORDALTs, as well as indoctrination of ship's force personnel concerning new capabilities of gun weapon systems are primary concerns of the shipboard installation manager.

On the basis of the conclusions of the study, the following recommendations are offered:

- The capability of waterfront facilities to remove and install gun weapon systems aboard ship should be improved, as set forth in this study, to meet current and projected overhaul requirements for the GWSRP.
- The GWSRP Reporting System should be automated to enable GWSRP managers to efficiently support MCR inspection requirements.
- Procedures and administrative structure, as provided in the preliminary management plan for the GWSIP, should be implemented to support shipboard installation of the 3"/50 GWSIP ORDALT kits.

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CHAPTER ONE

INTRODUCTION

1.1 REPORT BACKGROUND

This report summarizes the work performed by ARINC Research Corporation for Naval Ordnance Station, Indian Head (NAVORDSTA, I.H.), Maryland, from 22 August 1980 through 21 May 1981. The objective of this effort was to provide engineering and management support for the 3"/50 Gun Weapon System Improvement Program (GWSIP) and the Gun Weapon Systems Replacement Program (GWSRP). Contract N00174-80-C-0438 specified four tasks to be conducted in support of these programs. The tasks are as follows:

- Task 1 - Determine requirements for GWSRP equipment lifting gear for waterfront facilities.
- Task 2 - Provide technical assistance for implementation of an automated method for the transfer of data within the GWSRP Reporting System.
- Task 3 - Develop a preliminary management plan to accomplish ordnance alterations (ORDALTs) 9335 and 9409 in 3"/50 gun mounts affected by the GWSIP.
- Task 4 - Provide continuing engineering, logistic, and management support to NAVORDSTA, I.H.

1.2 HISTORICAL BACKGROUND

The following sections provide the historical background of the problems addressed in Tasks 1, 2, and 3.

1.2.1 Background of GWSRP Tasks

Tasks 1 and 2 address the following areas of continuing concern within the GWSRP:

- Determination of requirements for GWSRP lifting gear for existing waterfront facilities
- Automation of the transfer of data within the GWSRP Reporting System

A discussion of these two areas is presented in the following subsections.

1.2.1.1 GWSRP Lifting Gear Requirements for Waterfront Facilities

Removal and installation of gun weapon systems scheduled for overhaul under the GWSRP is a requirement that must be supported by various waterfront industrial faciiities, specifically Naval shipyards; Shore Intermediate Maintenance Activities (SIMAs); and, to a lesser extent, Supervisors of Shipbuilding, Conversion, and Repair (SUPSHIPs). The gun weapon systems currently in the program are the 3"/50 Mk 33, 5"/38 Mk 30 and Mk 38, 5"/54 Mk 45 and Mk 42 gun mounts, and the Mk 68 Gun Fire Control System (GFCS). Because of the varying configuration and weight of each of these systems, special lifting gear has been designed for safe removal and installation of each system. Lifting gear apparatus for current and future GWSRP gun mount and GFCS equipment are described in various Naval Sea Systems Command (NAVSEASYSCOM) publications as the authorized equipment for performance of removal and installation operations. The concern GWSRP managers have about the capability of waterfront facilities to lift GWSRP equipment in accordance with the appropriate technical manual procedures has created a need to determine the current and future requirements for gun mount and GFCS lifting gear for the various waterfront activities.

1.2.1.2 Automation of the GWSRP Reporting System

The GWSRP Reporting System provides various reports containing data from Material Condition Reviews (MCRs), which are conducted by the respective Naval Sea Support Center Detachments (NAVSEACENDETs), Atlantic (NAVSEACENLANTDET) and Pacific (NAVSEACENPACDET). MCR results are currently distributed by the NAVSEACENDETs submitting summary reports to the appropriate Type Commander (TYCOM) and the Gun Systems Engineering Division, NAVORDSTA, I.H. The information is reviewed and edited by NAVORDSTA, I.H., then mailed to the Weapons Quality Evaluation Center (WQEC), Concord, California, Code 384, where it is entered into a computer data bank.

The current system of transferring data is a manual one that demands excessive technical manpower and is not totally responsive to management requirements. In addition, new GWSRP gun weapon systems that are currently or will eventually be installed -- i.e., the Mk 86 GFCS, the Mk 15 Close-In Weapon System (CIWS), and the 5"/54 Mk 45 and 76 mm Mk 75 gun mounts -- will impose an additional burden in terms of man-hours required to inspect the systems and record and transmit inspection results. In view of this situation, automation of the data transfer procedures has been proposed as a means to improve the quality and timeliness of the submitted MCR inspections and to meet the foreseen increased man-hour requirements. Use of on-line computer terminals to aid in the transfer of MCR data should greatly enhance real-time response, eliminate keypunch requirements, minimize errors in data transmission, and in general provide a more efficient reporting system.

1.2.2 Background of 3"/50 GWSIP Task

In 1976, the Chief of Naval Operations (CNO) directed that the primary mission of the 3"/50 guns be changed from antiair warfare (AAW) to surface warfare (SUW). CNO further required that the 3"/50 GWS provide efficient

and reliable surface capability to ships armed with 3"/50 guns. The scope of the improvements to the 3"/50 GWS was further clarified in CNO letter 03/C762358 of 16 September 1976, which provided for immediate implementation of three program elements -- the Mk 2 Mod 13 Loader, the Mk 172 Mod 0 Power-Drive Amplifier, and upgrade and replacement of the Mk 23 Target Designation Transmitter.

CNO letter 354/311109 of 9 March 1979 specified procurement of two ORDALT kits for the 3"/50 gun system -- the Mk 2 Mod 13 Loader (ORDALT 9335) and the Mk 172 Mod 0 Power-Drive Amplifier (ORDALT 9409). These ORDALT kits will be produced and installed under the 3"/50 GWSIP.

Accomplishment of ORDALT 9335 requires (1) the actual installation of the ORDALT kit in the oscillating assembly, and (2) replacement of the old assembly with the upgraded model aboard ship or during depot overhaul. The second activity will be performed at Naval Ordnance Station, Louisville (NAVORDSTALOU), for guns that will be inducted into the GWSRP.

Afloat replacement of the oscillating assembly is a major undertaking, especially for the 3"/50 gun mounts that are shielded, because the shield must be removed to affect installation. Initial estimates of oscillating assembly replacement for shielded gun mounts is 300 man-hours (MH); unshielded mounts require 100 MH. Because 147 shipboard gun mounts must be replaced, replacement of the oscillating assembly and the power-drive amplifier assemblies (which is not scheduled to begin until calendar year 1982) will be a major undertaking in terms of both man-hours and program scope. Therefore, management coordination is necessary to ensure that the GWSIP effort is successfully implemented.

1.3 STUDY OBJECTIVES

The objectives of this study were addressed in the following tasks:

- Task 1 - Determine the requirements for lifting gear at applicable waterfront facilities on the basis of current and future fleet needs. Establish a procedure by which waterfront facilities will acquire, maintain, and control appropriately assigned lifting gear.
- Task 2 - Provide continuing support in the implementation of an automated system for the transfer of data within the GWSRP Reporting System and develop recommendations to effect the orderly and most cost-effective transition from manual data-handling procedures to computerized methods.
- Task 3 - Provide GWSIP managers with a document describing the planning, scheduling, and coordination efforts involved in the shipboard installation of GWSIP ORDALT kits.
- Task 4 - Assist in the technical and administrative efforts required for management of programs and projects under the direction of NAVORDSTA, I.H. The primary objective of this effort is to investigate, review, and report developing requirements for overhaul of gun weapon systems.

1.4 METHOD OF INVESTIGATION

The following analytical procedures were applied to the aforementioned study tasks:

- Step 1: Collect Information. Data were collected concerning the program elements and the specific procedures followed for each task. The information consisted mainly of documents in the form of existing procedures (formal and informal), program management plans, instructions, technical manuals, and ordnance publications. Data were acquired from GWSRP, GWSIP, and Naval Ordnance publications (NAVORD OPs) and documentation, interview results, and ARINC Research files. Data collection was a continuing process; most of the information was collected in the early months of the contract.
- Step 2: Analyze Information. The data were systematically reviewed, and opportunities were identified for potential improvements and integration with existing procedures.
- Step 3: Develop Tentative Program Procedures and Improvements. Tentative program procedures and improvements were developed in the areas studied. Documented analyses and continuous contact with program personnel led to the initial findings.
- Step 4: Conduct Interviews. Concurrently with Step 3, the responsible principals in the GWSRP and GWSIP were interviewed, providing further information and insight into the documentation and the tasks. In addition, the procedures developed in Step 3 were discussed.
- Step 5: Develop Conclusions and Recommendations. The final step was to develop conclusions and recommendations on the basis of the analyses performed in Step 2.

1.5 REPORT ORGANIZATION

Each of the following chapters addresses a particular task. Conclusions and recommendations resulting from the analysis for a specific task are stated at the end of each chapter. Appendixes A through F present data supporting the analyses. Appendix G contains abbreviations and acronyms used in this report.

CHAPTER TWO

REQUIREMENTS FOR GWSRP LIFTING GEAR

2.1 PURPOSE

The purpose of this analysis was to provide GWSRP managers with a list of lifting gear required by Naval shipyards and SIMAs. The list was compiled on the basis of current and future fleet profiles. In addition, a procedure was provided for these waterfront activities to acquire, maintain, and control lifting gear.

2.2 METHOD OF ANALYSIS

The first part of this analysis consisted of identifying and listing all lifting gear applicable to gun mounts and GFCSs currently in the GWSRP and those projected to be included in the program. Waterfront facilities were then examined to determine the lifting rigs each facility is required to maintain for the installation and removal of gun weapon systems. Lifting rigs currently possessed by the facilities, as denoted in ARINC Research Publication 1665-01-1-2254, were taken into account, and an analysis was conducted to ascertain additional requirements.

Next, the Ships' Overhaul Schedule* was reviewed to determine which surface ships were assigned to each Naval shipyard for regular overhaul (ROH) from fiscal year (FY) 1981 through FY 1985. Each shipyard requires the appropriate lifting gear for the gun weapon systems installed on ships assigned for ROH. From this criterion, requirements and current outfitting status of lifting gear for the Naval shipyards could be determined.

A SIMA is a waterfront industrial facility that performs various maintenance actions on ships stationed there, including upkeep and support for gun weapon systems. Removal and installation of these systems is one task associated with this support. Because certain classes of ships (and their associated gun weapon systems) are not assigned to every locale, each SIMA will not require each type of lifting gear. From a review of a list** of

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*NAVSEASYSCOM letter SEA-06DD-12, Ser: 47, File 4710, dated 28 January 1981.

**Director, Department of the Navy Program Information Center letter 902K/586399, dated 3 October 1980.

active Fleet, Naval Reserve Force, and Naval Fleet Auxiliary Force Ships, home-port assignments of ships with the subject gun weapon systems were identified, and lifting gear requirements for each SIMA were determined.

The second part of this analysis consisted of collecting data related to establishment of a system to acquire, maintain, and control GWSRP lifting gear. Information on this subject was obtained from interviews with NAVSEA, NAVORDSTA, I.H., NAVORDSTALOU, and NAVSEACENDET personnel; findings were then analyzed and formulated into a system. The following sections present the results of this analysis.

2.3 ANALYSIS OF WATERFRONT REQUIREMENTS FOR GWSRP LIFTING GEAR

Applicable lifting gear were identified from data previously acquired under Contract N00174-79-C-0340. These data were then supplemented with information concerning the Mk 15 CIWS and the Mk 86 GFCS. Data on the CIWS lifting fixture were obtained from NAVORDSTALOU, which provided a copy of NAVSEASYSCOM drawing number 5189832. Information on the lifting rigs for the above-deck equipment of radar sets AN/SPQ-9A and AN/SPG-60, units of the Mk 86 GFCS, was obtained from NAVORD OP 3759. Table 2-1 lists all GWSRP lifting fixtures and their respective drawing numbers. Each fixture is illustrated in Appendix A. Lifting gear for the 5"/38 Mk 38 Twin Gun Mount and the Mk 56 Gun Director were purposely omitted from the table. The Mk 38 gun mount is currently being phased out of the GWSRP, and a capability to lift this gun weapon system is not a planned requirement. The Mk 56 director is currently being phased down to an active fleet allocation of 21 units by FY 1989; it is easily lifted by standard lifting gear common to waterfront facilities, and therefore was also omitted from the study.

Table 2-2 shows the GWSRP gun weapon systems currently installed or scheduled to be installed on all United States Navy surface combatants. The table lists all active ship classes alphabetically by type of ship, such as CV (aircraft carrier), and by name of the class (e.g., FORRESTAL). Ships currently under development, such as the CG-47 (TICONDEROGA class cruiser), are also included.

Lifting gear requirements for Naval shipyards and SIMAs were determined as described in the following section.

2.3.1 Lifting Gear Requirements for Naval Shipyards and SIMAs

Analysis of which ships are scheduled for overhaul at each Naval shipyard can aid in establishing requirements for lifting fixtures for each shipyard. Table 2-3 was developed on the basis of the Ships' Overhaul Schedule, dated 28 January 1981. The table displays the eight Naval shipyards (NSYs) and lists by hull number the surface ships with GWSRP gun weapon systems installed that are scheduled for overhaul at the facilities between FY 1981 and FY 1984. Portsmouth and Mare Island NSYs do not have

Table 2-1. GWSRP LIFTING RIGS

Assembly	Drawing Number
3"/50 Mount Mk 33 Mod 0	SK 225011-1
3"/50 Mount Mk 33 Mod 13	SK 225011-39
5"/38 Mount Mk 30	180793
Front Lifting Lug	236208-2
Rear Lifting Lug	236208-1
5"/54 Mount Mk 42	964089
Lifting Bracket Mod 9	2594613
Lifting Bracket Mod 10	2873007
5"/54 Mount Mk 45	2527319
Mk 21 Barrel Lifting Fixture	2642626
76 mm Mount Mk 75	1376-97-108*
Gun Mount Shipping and Handling Fixture	1376-97-112*
Transport Base	4276-14-100/01*
Mount Foundation Drilling Fixture	4276-14-100/04*
Close-In Weapon System (CIWS) Mk 15	5189832
Director Mk 68	1332821
AN/SPG-60 Radar	NAVORD OP 3759
AN/SPQ-9A Radar	NAVORD OP 3759

*OTO Melara Drawing Number.

Table 2-2. GWSRP COGNIZANT GWSs EMPLOYED ON ACTIVE U.S. NAVY SURFACE COMBATANTS

Ship Class and Name		Gun Weapon Systems
AE-23	NITRO	3"/50 Mk 33
AE-26	KILAUEA	3"/50 Mk 33 CIWS
AFS-1	MARS	3"/50 Mk 33
AOE-1	SACRAMENTO	3"/50 Mk 33 CIWS
AOR-1	WICHITA	CIWS
AS-33	SIMON LAKE	3"/50 Mk 33
CG-16	LEAHY	CIWS
CG-26	BELKNAP	5"/54 Mk 42 Mk 68 Director CIWS
CG-47	TICONDEROGA	5"/54 Mk 45 AN/SPG-60 AN/SPQ-9A CIWS
CGN-9	LONG BEACH	5"/38 Mk 30 CIWS
CGN-25	BAINBRIDGE	CIWS
CGN-35	TRUXTUN	5"/54 Mk 42 Mk 68 Director CIWS
CGN-36	CALIFORNIA	5"/54 Mk 45 AN/SPG-60 AN/SPQ-9A CIWS
CGN-38	VIRGINIA	5"/54 Mk 45 AN/SPG-60 AN/SPQ-9A CIWS
CV-41	MIDWAY	CIWS
CV-59	FORRESTAL	CIWS
CV-63	KITTY HAWK	CIWS
CV-67	KENNEDY	CIWS
CVN-65	ENTERPRISE	CIWS
CVN-68	NIMITZ	CIWS
DD-931	FORREST SHERMAN	5"/54 Mk 42 Mk 68 Director
DD-945	HULL	5"/54 Mk 42 Mk 68 Director
DD-963	SPRUANCE	5"/54 Mk 45 AN/SPG-60 AN/SPQ-9A CIWS
DDG-2	ADAMS	5"/54 Mk 42 Mk 68 Director
DDG-15	BERKELEY	5"/54 Mk 42 AN/SPG-60 AN/SPQ-9A
DDG-31	DECATUR	5"/54 Mk 42 Mk 68 Director
DDG-37	FARRAGUT	5"/54 Mk 42 Mk 68 Director
DDG-993	KIDD	5"/54 Mk 45 AN/SPG-60 AN/SPQ-9A CIWS
FF-1037	BRONSTEIN	3"/50 Mk 33
FF-1040	GARCIA	5"/38 Mk 30
FF-1052	KNOX	5"/54 Mk 42 Mk 68 Director CIWS
FFG-1	BROOKE	5"/38 Mk 30
FFG-7	O.H. PERRY	76 mm Mk 75 CWIS
LCC-19	BLUE RIDGE	3"/50 Mk 33 CWIS
LHA-1	TARAWA	5"/54 Mk 45 AN/SPG-60 AN/SPQ-9A CWIS
LKA-113	CHARLESTON	3"/50 Mk 33 CWIS
LPD-1	RALEIGH	3"/50 Mk 33 CWIS
LPD-4	AUSTIN	3"/50 Mk 33 CWIS
LPH-2	IWO JIMA	3"/50 Mk 33 CWIS
LSD-28	THOMASTON	3"/50 Mk 33
LSD-36	ANCHORAGE	3"/50 Mk 33 CWIS
LST-1179	NEWPORT	3"/50 Mk 33 CWIS
PHM-1	PEGASUS	76 mm Mk 75

Table 2-3. SURFACE COMBATANTS SCHEDULED FOR ROH AT NAVAL SHIPYARDS FROM FY 1981 TO FY 1984

Charleston	Norfolk	Philadelphia	Portsmouth	Long Beach	Mare Island	Puget Sound	Pearl Harbor
AS-33	CGN-25	CG-27		CG-16		CG-32	CG-18
CG-19	CGN-36	DD-969		CG-23		CGN-9	DD-948
CG-20	CGN-37	DD-970		CG-30		CGN-35	DD-950
CG-28	CGN-38	DD-977		CG-33		CV-63	DDG-16
DDG-2	DDG-3	DD-979		DD-945		DDG-8	DDG-20
DDG-40	DDG-4	DD-981		DD-964		DDG-12	DDG-21
FF-1085	DDG-5	DDG-11		DD-965		FF-1054	DDG-22
FF-1089	DDG-6	DDG-17		DD-966		FF-1058	DDG-34
FF-1092	DDG-10	DDG-18		DD-973		FF-1088	FF-1045
FF-1098	DDG-23	DDG-19		DD-976			FF-1057
FFG-6	DDG-38	DDG-37		DD-984			FF-1062
	DDG-41	DDG-43		DD-985			FF-1071
	LHA-2	FF-1082		DD-986			FF-1074
	LPD-4	FF-1084		DD-991			FF-1077
	LSD-38	FFG-4		DDG-7			FF-1086
		FFG-5		DDG-13			
		LCC-20		DDG-14			
		LPD-3		DDG-15			
		LPH-7		DDG-24			
		LPH-9		DDG-33			
				FF-1065			
				FF-1069			
				FF-1070			
				FF-1076			
				FFG-1			
				FFG-2			
				FFG-3			
				LHA-1			

any surface ships scheduled for overhaul; these facilities are employed principally to overhaul submarines. Therefore, Portsmouth NSY does not require lifting gear for gun weapon systems. Because Mare Island NSY is the designated overhaul point (DOP) for all 5"/38 gun mounts, it requires the lifting fixture for that particular gun weapon system. In addition, the NAVSEACENPACDET field office at Mare Island NSY currently installs and removes 3"/50 gun mounts and will be required to install and remove CIWSs on ships home-ported in nearby Alameda.

The list of active Fleet, Naval Reserve Force, and Naval Fleet Auxiliary Force Ships, dated 3 October 1980, was reviewed to identify the home ports of active ships with GWSRP gun weapon systems. Table 2-4, compiled from this information, lists the SIMAs and every class of surface ship with GWSRP systems home-ported at the SIMAs.

Table 2-4. CLASSES OF SHIPS HOME-PORTED AT SIMA SITES

Little Creek	Norfolk	Charleston	Mayport	San Diego	Pearl Harbor
LSD-28	AFS-1	AE-26	CG-16	CG-16	CG-16
LSD-36	AOE-1	AS-33	CV-59	CG-26	DD-945
LST-1179	AOR-1	CG-16	DD-931	CGN-9	DDG-15
	CG-16	CG-26	DDG-2	CGN-25	DDG-31
	CG-26	DD-931	DDG-15	CGN-35	FF-1040
	CGN-36	DD-963	DDG-37	CV-59	FF-1052
	CGN-38	DDG-2	FF-1040	CV-63	
	CV-59	DDG-15	FF-1052	DD-945	
	CV-63	DDG-37	FFG-1	DD-963	
	CV-67	FF-1040	FFG-7	DDG-2	
	CVN-68	FF-1052		DDG-15	
	DD-931	FFG-1		DDG-31	
	DD-963			FF-1040	
	DDG-2			FF-1052	
	DDG-15			FFG-1	
	DDG-37			LHA-1	
	FF-1037			LKA-113	
	FF-1052			LPD-1	
	FFG-1			LPD-4	
	LCC-19			LPH-2	
	LHA-1			LSD-28	
	LKA-113			LSD-36	
	LPD-1			LST-1179	
	LPD-4				
	LPH-2				

Requirements for Naval shipyards were determined on the basis of the information in Tables 2-2 and 2-3; requirements for SIMAs were determined from Tables 2-2 and 2-4. This information was incorporated into Table 2-5. The table shows which facilities already possess proper gear, which have no requirement for certain types of fixtures, which require new gear, and which have some makeshift or improper gear in use and thus require new gear. This information should serve as the basis for making decisions concerning lifting gear procurement and distribution.

Table 2-5. GWSRP LIFTING GEAR REQUIREMENTS FOR WATERFRONT FACILITIES

Location	3"/50 Mk 33	5"/38 Mk 30	5"/54 Mk 42	5"/54 Mk 45	76 mm Mk 75	CIWS Mk 15	Mk 68 Dir.	SPQ-9A Radar	SPG-60 Radar
Naval Shipyard									
Philadelphia	X*	X	P	R		R	R	R	R
Portsmouth									
Norfolk	X*	P	P	R	R	R	R	R	R
Charleston	X*	P	P	R		R	R	R	R
Long Beach	X	X	X	R	R	R	R	R	R
Mare Island	R	X				R			
Puget Sound	P	P	P			R	R		
Pearl Harbor	X*	X	X			R	R		
Shore Intermediate Maintenance Facility									
Mayport	X	X	X	R	R	R	X	R	R
Little Creek	X					R			
Norfolk	S*	S	S	S	S	S	S	S	S
Charleston	S	S	S	S		S	S	S	S
San Diego	P	X	X	R	R	R	R	R	R
Pearl Harbor	S	S	S			S	S		
Total to be Procured	8	6	4	6	4	10	8	6	6

X - Improper or makeshift gear in use; new gear required.
S - Will share gear with Naval shipyard.
P - Proper gear in use.
R - New gear required.
Blank - No requirement for gear.
*Possesses proper gear for 3"/50 Mk 33 Mod 0 only.

The results presented in Table 2-5 are subject to occasional changes, because the Ships' Overhaul Schedule is subject to change. Certain ships could possibly be assigned to another shipyard, which could necessitate a

change in that facility's lifting gear requirements. Similarly, certain ships could be transferred to a different home port, resulting in a requirement for a SIMA to possess a particular lifting rig.

2.3.2 Common Lifting Gear

Removal and installation of a major gun weapon system is not an everyday occurrence. Therefore, at sites where both a Naval shipyard and a SIMA are located (e.g., Norfolk and Pearl Harbor), it is recommended that the shipyard maintain sets of lifting gear to be used by both waterfront facilities. It is further recommended that, if a requirement exists for the nearby SIMA to employ a lifting rig, the fixture be borrowed from the shipyard.

Many United States Navy surface ships undergo ROH in various private shipyards throughout the country. Therefore, these private shipyards also must employ the proper lifting gear for removal and installation of gun weapon systems. To satisfy this need, it is recommended that NAVSEACENLANTDET and NAVSEACENPACDET each acquire at least one set of every type of lifting gear listed in Table 2-1 and maintain these lifting rigs to support private shipyards in the removal and installation of GWSRP gun weapon systems. These lifting fixtures could be sent to a Naval shipyard or SIMA for use if an unforeseeable need should arise to remove or install a gun weapon system for which lifting gear is not normally maintained.

2.3.3 Special Considerations for 3"/50 GWSIP

The 3"/50 GWSIP (described in Chapter Four) will involve shipboard replacement of 3"/50 Mk 33 Mod 0 and Mod 13 gun mount oscillating assemblies. Installation and removal of these assemblies aboard ship requires special lifting gear designed solely for lifting oscillating assemblies. Table 2-6 lists this required gear with the associated drawing numbers. Because of the relatively short-term need for this gear (replacement of 3"/50 GWSIP oscillating assemblies is currently scheduled to be completed by FY 1985), it is not necessary to acquire and position needed 3"/50 oscillating assembly lifting gear to the extent previously recommended for other gun mounts. An alternative approach to meet the waterfront facility requirement for 3"/50 oscillating assembly lifting gear as imposed by the 3"/50 GWSIP is to provide both NAVSEACENLANTDET and NAVSEACENPACDET with a sufficient number of oscillating assembly gear. The appropriate NAVSEACENDET could then send the gear to the various waterfront facilities to effect a replacement of the 3"/50 GWSIP oscillating assembly as necessary. Since the NAVSEACENDETs are intimately involved with scheduling 3"/50 GWSIP oscillating assembly installations and are involved in most of the installation operations, this approach seems to be both economical and feasible.

2.4 ACQUISITION, MAINTENANCE, AND CONTROL OF GWSRP LIFTING GEAR

In view of the high cost of GWSRP lifting equipment, the fixtures must be maintained in proper working condition and must be accounted for. Also, additional gear will have to be procured when an activity requires a type

Table 2-6. LIFTING GEAR FOR 3"/50 GUN MOUNT OSCILLATING ASSEMBLY

Item	Quantity	Drawing Number
Purchase Ring	1	511654-2
Wire Rope Pendant (Upper)	3	511654-1
Wire Rope Pendant (Lower Back)	2	511654-3
Wire Rope Pendant (Lower Front)	1	511654-4
Lifting Beam	1	511653-1
Barrel Ring	1	511654-5
Support Bar (Short)	1	511653-2
Nut	2	43-N-6926-75
Locknut	2	43-N-3745-75
Bolt	2	511653-4

of lifting rig it does not already possess, or when old gear must be replaced because of failure to meet weight testing and nondestructive testing (NDT) requirements. The following sections establish and define procedures for acquiring, maintaining, and controlling lifting gear for gun weapon systems in the GWSRP.

2.4.1 Acquisition

Lifting gear for each waterfront facility should initially be procured in accordance with the requirements displayed in Table 2-5. NAVORDSTA, I.H., should acquire the gear and distribute it to the appropriate facilities. If a waterfront facility requires a new lifting rig (either because it does not possess a particular rig, or because the rig does not meet weight testing and NDT requirements), it should be the responsibility of the appropriate NAVSEACENDET to fulfill that requirement.

The procedure for fulfilling a new lifting gear requirement for a particular waterfront facility will depend on the urgency of the situation. If it is an immediate, one-time requirement, the appropriate NAVSEACENDET should arrange a transfer of lifting gear from a nearby waterfront facility or from its own spares. If it is a lasting requirement, but not an urgent situation, the appropriate NAVSEACENDET should submit a request to NAVORDSTA, I.H., Code 5232H. NAVORDSTA, I.H., should then ensure that the specified gear is provided to the appropriate waterfront facility. The NAVSEACENDET should also be responsible for assigning an appropriate serial number to the gear for accounting purposes, as described in Section 2.4.3.

If a waterfront facility requires a part of a lifting rig that can be easily acquired (e.g., a shackle or bolt), the facility should either procure the part through the Navy supply system or have it manufactured locally, utilizing the appropriate technical drawing. If necessary, NAVSEACENDETs should assist the waterfront facilities in acquiring the part.

2.4.2 Maintenance

Because of the substantial cost and safety factors associated with gun weapon system lifting gear, proper maintenance of the gear is of paramount importance. Waterfront facilities should maintain GWSRP lifting gear and perform periodic weight testing and NDT in accordance with the guidance set forth in NAVSEA OP 1810, Ordnance Equipment Handling and Shipping Instruction, pertinent NAVSEA directives, and the applicable engineering drawing for each set of gear. When weight tests are completed, they should be duly recorded on the gear itself as specified in Section 1-7 of OP 1810. The material condition of the lifting fixtures and the completion of periodic weight testing should be reported by each waterfront facility to the appropriate NAVSEACENDET during yearly inventory, as described in the following section.

2.4.3 Control

To effect a more centralized control and accountability of GWSRP lifting gear, the NAVSEACENDETs should be designated as the central control points for their respective coasts. NAVORDSTA, I.H., should supply the initial gear to the various waterfront facilities, with the assistance of the NAVSEACENDETs. Each NAVSEACENDET should be responsible for serializing each set of lifting gear so that accountability can be maintained. To achieve compatibility with this serial system, all gear currently at the waterfront facilities should be assigned new serial numbers under the direction of the NAVSEACENDETs.

All GWSRP lifting gear should be inventoried yearly by the various waterfront facilities as directed by the respective NAVSEACENDET. The results of this annual inventory should be included in a report that will specify the following data:

- Type of fixture (e.g., CIWS, 76 mm)
- Serial number of each type of lifting gear
- Date of last use of lifting gear
- Date of last weight test
- Material condition of each set of gear
- Any problems with the rig (e.g., missing parts, irregular wear, or corrosion)

This report should be submitted in a letter format to the appropriate NAVSEACENDET and forwarded to NAVORDSTA, I.H. An example of a completed letter (for Philadelphia NSY) is shown in Figure 2-1.

2.5 CONCLUSIONS AND RECOMMENDATIONS

Lifting gear requirements for waterfront facilities were determined from the analysis of GWSRP lifting gear inventories, the Ships' Overhaul Schedule, and the list of United States Navy ships. Recommended procedures for the acquisition, maintenance, and control of GWSRP lifting gear were developed to improve the long-term capabilities of the various waterfront facilities to remove and install gun weapon systems and their associated equipment. The following sections present the conclusions and recommendations that resulted from the study of GWSRP lifting gear capabilities of waterfront facilities.

2.5.1 Conclusions

The following conclusions resulted from the analysis:

- Waterfront facilities have different requirements for GWSRP lifting gear, and many facilities lack the gear they need to meet these requirements.
- Increased controls are needed concerning acquisition, maintenance, and overall accountability of GWSRP lifting gear. A central control point for each coast is also required, which would be responsible for the acquisition, maintenance, and control of GWSRP lifting gear.
- Weight testing and NDT requirements for lifting fixtures must be followed to ensure that the gear is properly maintained and certified.
- The 3"/50 GWSIP will necessitate an increased short-term requirement for 3"/50 oscillating assembly lifting gear at the various waterfront facilities.

2.5.2 Recommendations

On the basis of the conclusions, the following recommendations are offered:

- Waterfront facilities required to remove and install gun weapon systems should be provided with the proper lifting gear as set forth in Table 2-5.
- At sites where both a Naval shipyard and a SIMA are located, the shipyard should maintain sets of lifting gear to be used by both waterfront facilities.

12 January 1982
(Date)

From: Naval Shipyard, Philadelphia, Pa.

To: Naval Sea Center Atlantic Detachment ATTN: Code 91B

Subj: Annual GWSRP Lifting Gear Inventory

1. The following annual inventory data are submitted:

Type	Serial Number	Date Last Used	Date Last Weight Test	Condition (Poor, Good, or Excellent)
5"/38 Mk 30	12	11/17/81	11/17/81	Good
5"/54 Mk 42	3	7/12/81	7/12/81	Good
5"/54 Mk 45	8	3/25/81	3/21/81	Good
SPQ-9A	3	5/12/81	5/10/81	Good
SPG-60	3	5/12/81	5/10/81	Good

2. Remarks/Problems:

5"/54 Mk 42 is missing a set of lifting pads for Mod 9 gun mount.

W. T. Door
Name

Combat Systems Office Code 191.1
Authority/Code

Figure 2-1. SAMPLE INVENTORY SHEET FOR GWSRP LIFTING GEAR

- NAVSEACENLANTDET and NAVSEACENPACDET should be designated as the central control points for the acquisition, maintenance, and control of GWSRP lifting gear.
- Weight testing and NDT of lifting gear should be re-emphasized. Test results and other noteworthy maintenance should be reported annually to the appropriate NAVSEACENDET and forwarded to NAVORD-STA, I.H.
- NAVSEACENDETs should maintain at least one set of every type of lifting rig for use by private shipyards while the shipyards are under contract to remove and install gun weapon systems.
- NAVSEACENDETs should maintain an appropriate number of 3"/50 oscillating assembly lifting gear to be used by the various waterfront facilities involved in the 3"/50 GWSIP.

CHAPTER THREE

AUTOMATION OF DATA EXCHANGE FOR THE GWSRP REPORTING SYSTEM

3.1 PURPOSE

The major emphasis of this study included determining and coordinating operating procedures and hardware capabilities of all organizations participating in the GWSRP Reporting System to ensure overall system compatibility. The organizations involved in the reporting system are NAVSEACENLANTDET, NAVSEACENPACDET, NAVORDSTA, I.H., and WQEC, Concord.

3.2 UPDATED HARDWARE CAPABILITIES AND DATA TRANSFER PROCEDURES FOR THE GWSRP REPORTING SYSTEM

Hardware capabilities and operating procedures for the transfer of data within the GWSRP Reporting System -- for both the current and envisioned automated reporting systems -- were analyzed in a previous ARINC Research study performed under Contract N00174-79-C-0340. The findings of these analyses are presented in ARINC Research Publication 1665-01-1-2254. New information that has been collected over the course of the current contract modifies the previous assessments of hardware capabilities and data transfer procedures at various participating organizations. These modifications are presented in the following sections.

3.2.1 Updated Hardware Capabilities

Hardware configurations to support automation of the GWSRP Reporting System are listed below by facility:

- NAVSEACENLANTDET - There were no changes to the previously reported hardware configuration, which is a Wang 2000 Series system used to support the Ship's Equipment Configuration Accounting System (SECAS) Program. However, a command reorganization within NAVSEACENLANTDET has changed the location of the computer facility; it is now located adjacent to NAVSEACENLANTDET Headquarters. This change makes utilization of the system more convenient for potential system users.
- NAVSEACENPACDET - Use of a newly acquired TEXTRONIX 4051 system, located in the same building as the GWSRP managers, is now possible. However, a modulator/demodulator (MODEM) must be installed so that telecommunications can occur between NAVSEACENPACDET and NAVORDSTA, I.H.

- NAVORDSTA, I.H. - Use of the PDP-1140 series (instead of the DATA 100 system) at NAVORDSTA, I.H., has been confirmed. The PDP-1140 series system has a MODEM to effect data transfer via telecommunications and ample storage capacity to accommodate data base requirements at NAVORDSTA, I.H.
- WQEC, Concord - Because of funding constraints, use of the PDP-1140 series system is no longer possible. Therefore, the Honeywell 2200 system, which is currently used for batch processing of MCR reports, will be required to receive and transmit data. Data input into this computer system will follow the procedure described in the following section.

3.2.2 Updated Procedures for Transfer of Data

On the basis of the results of our analysis conducted during the course of the current contract, NAVORDSTA, I.H., has decided to change the previously proposed operating procedures for the automated transfer of data as follows:

- MCR inspection summary sheets will be transferred from the respective NAVSEACENDETs to WQEC, Concord, via NAVORDSTA, I.H., as they are completed, instead of five to ten inspections being processed at a time. This will enhance the real-time response of the GWSRP Reporting System and provide a more current data base.
- A desired feature of the automated system is the ability to query the data base for specific information. For GWSRP activities on each coast to have access to the data base, distributed data storage is required. Therefore, NAVORDSTA, I.H., will maintain a current MCR data base for the east coast, while WQEC, Concord, will maintain information for the west coast. Decentralization of the data base will provide users on each coast with greater access to and better control over the data base. In addition, maintenance of duplicate records at WQEC, Concord, and at each NAVSEACENDET will provide an added degree of security in the event of hardware failure.

3.3 CONCLUSIONS AND RECOMMENDATIONS

As a result of the study concerning the proposed automation of the GWSRP Reporting System, new hardware capabilities at various organizations were realized, and improved operating procedures were developed.

3.3.1 Conclusions

The following conclusions resulted from this study effort:

- Transmission of MCR inspection data as they are attained will greatly enhance the real-time response of the GWSRP Reporting System and provide for a more current data base.

- Decentralization of the GWSRP data base can substantially reduce data communication costs. In addition, users on the east coast will have faster access to and better control over data records, and an added degree of security will be obtained by maintenance of redundant files.
- Procedures to automate the GWSRP Reporting System as recommended in ARINC Research Publication 1665-01-1-2254 are still valid.

3.3.2 Recommendations

On the basis of the conclusions, the following recommendations are offered:

- The automated transfer of data within the GWSRP Reporting System should proceed as suggested in ARINC Research Publication 1665-01-1-2254.
- Improvements concerning the periodicity of data processing, decentralization of the data base, and hardware capabilities of the participating organizations, as specified in this study, should be integrated into the proposed procedures for automating the transfer of data within the GWSRP Reporting System.

CHAPTER FOUR

PRELIMINARY MANAGEMENT PLAN FOR SHIPBOARD INSTALLATION OF 3"/50 GUN WEAPON SYSTEM IMPROVEMENTS

4.1 PURPOSE

The Preliminary Management Plan (PMP) for shipboard installation of 3"/50 gun weapon system improvements under the GWSIP was developed to provide guidance to participating organizations for planning, scheduling, and coordinating shipboard installation efforts. The PMP describes program objectives, policies, organizational responsibilities, and management organizational structure. An important consideration in developing the PMP was to ensure the definition of an organizational structure autonomous from the production effort. The PMP is reproduced in Appendix B.

4.2 DEVELOPMENT ACTIVITIES FOR THE GWSIP PMP

Our activities in developing the GWSIP PMP for shipboard ORDALT installations included the following:

- Discussing with representatives of NAVSEA and NAVORDSTA, I.H., the roles and responsibilities of the key participating organizations required to support the shipboard installation of GWSIP ORDALT kits
- Identifying the need for a specialized reporting system -- the GWSIP Reporting System (GRS) -- which would reflect current configuration information and present configuration mixing for ships with multiple gun mounts
- Identifying the need for GWSIP managers to coordinate ORDALT kit installations with the CIWS program to eliminate conflicts in planned installations between the two programs
- Developing the organizational requirements and operational procedures for the GRS
- Developing a work breakdown structure (WBS) for controlling and funding the GWSIP ORDALT shipboard installation effort
- Determining coordination efforts required of the shipboard installation team to ensure proper indoctrination of ship's force and reporting of completed GWSIP ORDALTs

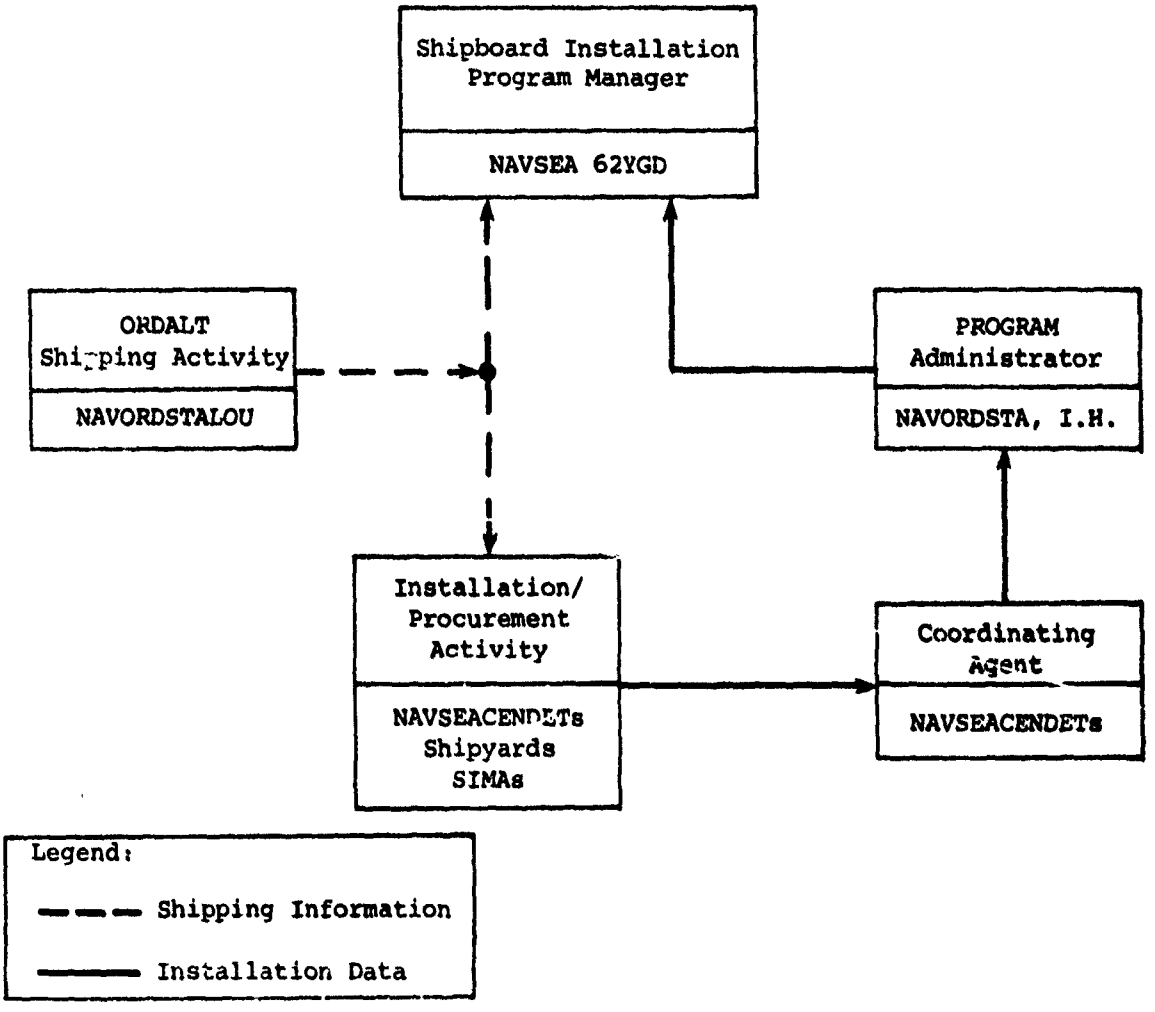


Figure 4-1. GWSIP REPORTING SYSTEM (GRS)

4.3.1 Shipboard Installation Program Manager (NAVSEA 62YGD)

As GWSIP shipboard installation program manager, NAVSEA 62YGD will provide overall program direction. The GRS will be based on completion goals as set forth in quarterly installation schedules disseminated by NAVSEA 62YGD (see Chapter Three). NAVSEA 62YGD will also review, approve, and distribute information regarding GWSIP shipboard installation status (submitted by NAVORDSTA, I.H.) on a quarterly basis.

4.3.2 ORDALT Shipping Activity (NAVORDSTALOU)

An in-service engineering agent (ISEA) function of NAVORDSTALOU is reporting shipment of GWSIP ORDALT kits. When a GWSIP ORDALT kit is shipped to an installation/procurement activity, NAVORDSTALOU will report it to

CHAPTER FIVE

PLANNING SUPPORT FOR OVERHAUL OF THE GUN WEAPON SYSTEMS

5.1 PURPOSE

The principal objective of this task was to provide continuing engineering, logistic, and management support to NAVORDSTA, I.H., concerning emerging overhaul requirements for gun weapon systems. In support of this effort, various meetings were attended to obtain and provide information related to contract tasks and to gain insight into general problems and trends in the GWS. The meetings are listed in Table 5-1.

Table 5-1. MAJOR MEETINGS ATTENDED IN SUPPORT OF GWS MAINTENANCE

Date	Location	Subject
17 September 1980	NAVSEA Code 62Y1	3"/50 GWSIP Review Meeting
23 September 1980	ARINC Research	Program Review
9 October 1980	NAVORDSTA, I.H.	Contract Tasks 1 and 2 Review
28 to 29 October 1980	ARINC Research	Contract Tasks 2 and 4 Review
17 to 21 November 1980	NAVORDSTALOU	Semiannual GWSRP Planning Meeting
4 December 1980	NAVORDSTA, I.H.	Contract Task 1 Review
23 February 1981	NAVSEACENLANTDET Code 91B	Contract Tasks 1 Through 4 Review
24 February 1981	NAVSEACENLANTDET Code 924	Contract Task 2 Review
1 April 1981	ARINC Research	Contract Task 3 Review
9 April 1981	ARINC Research	Contract Task 4 Review
12 May 1981	NAVORDSTALOU	Semiannual GWSRP Planning Meeting

5.2 GWSRP-RELATED STUDIES

The following sections address several areas that directly affect overhaul planning for gun weapon systems included in the GWSRP.

5.2.1 Participation in the Semiannual GWSRP Conference

As reported in pages 1-6 and 1-7 of ARINC Research Publication 1685-01-SR-2544 (delivered under the current contract), ARINC Research personnel actively participated in the revision of the semiannual GWSRP Conference Report. The decision to redesign the report stemmed from the realization of NAVSEA 62YG (Gun Weapon System Support Office) that each conference has generated several action items that are often unrelated to the gun overhaul process, yet indirectly affect the program. In an effort to be responsive to the complaints of the conference participants, each complaint was identified as an action item. These action items were often similar, and should have been consolidated and resolved by a single responsible office. Unfortunately, the action items were most often assigned to the wrong office for resolution, with the result that no action was taken. Because of this, the number of outstanding action items increased. To resolve this problem in the future, action items unrelated to the GWSRP will not appear in the Conference Report, but will be resolved by the concerned parties themselves at the GWSRP conference or through communication and correspondence following the conference. Action items related to the GWSRP will be consolidated into a single item, with responsibility assigned to the correct office. The text of the Conference Report is presented in Appendix C. The Conference Report developed from the May 1981 GWSRP conference is currently being reviewed.

ARINC Research also prepared a presentation given at the GWSRP conference by NAVSEA 62YG. Appendix D contains copies of the slides used in the presentation. Slide No. 1 is an overview of the processes involved in the GWSRP conference; Slide No. 2 shows the process involved in the inspection and induction of GWSRP equipment; and Slide No. 3 depicts the current and future status of the GWSRP in terms of United States Fleet equipment populations.

The presentation was developed because the conference has grown from a small group of attendees to a large body of over 70 people. Many of these new participants were unfamiliar with the mechanics of the material inspection process and the current and projected scope of the GWSRP. Many attendees also are involved with budget development for this overhaul program, and their interest in supporting the program needed to be aroused.

5.2.2 Overhaul Requirements for Mk 45 Gun Mount

ROH information for ships equipped with Mk 45 gun mounts was reviewed to determine the future impact of inducting these gun mounts into the GWSRP. The review was based on information contained in NAVSEASYSCOM letter SEA-06DD-12, Ser: 47, File 4710, dated 28 January 1981 (Ships' Overhaul Schedule). An ROH schedule for these ships was developed to assist

NAVSEA and NAVORDSTA, I.H., GWSRP managers in planning the overhaul induction schedule for the 5"/54 Mk 45 gun mount. A graphical presentation of this schedule is presented in Appendix E.

5.2.3 Consolidation of Material Condition Review and Pre-Overhaul Test and Inspection (POT&I)

Under the current contract, an effort was undertaken by NAVORDSTA, I.H., to consolidate the inspection requirements for the MCR and the POT&I into one inspection document. This effort currently is limited to new gun weapon systems (the Mk 45 gun mount and the Mk 86 GFCS). The requirement for this effort originated from the agreement between NAVSEA 62YGB and Planning and Engineering for Repairs and Alterations (Cruisers/Destroyers) (PERA [CD]), Code 1802, which integrated the requirements for POT&I and MCR inspection. This agreement was made on the basis of recommendations contained in ARINC Research Publication 1665-02-2-1818 of October 1978. It is anticipated that future MCR inspections concerning other GWSRP gun weapon systems will reflect joint POT&I and MCR inspection requirements.

5.2.4 Status of Nonexpendable Ordnance Readiness

Another GWSRP-related study undertaken by ARINC Research concerned the analysis of actual versus funded requirements for GWS overhauls from FY 1980 through FY 1982. The purpose of the project was to identify the necessary increase in NAVSEA's overhaul program to accommodate the increased population and cost of fleet-requested gun system overhauls. An issue paper was developed concerning this subject, resulting in additional funding in FY 1981 for the GWSRP. This issue paper is presented in Appendix F.

5.3 CONCLUSIONS AND RECOMMENDATIONS

5.3.1 Conclusions

The following conclusions resulted from the GWSRP-related analyses:

- Assistance provided by ARINC Research in documenting the action items from the GWSRP conference has increased the ability of the NAVSEA GWSRP manager to generate meaningful action items and to assign appropriate responsibility to conference participants. Increased attention to the editing of the GWSRP minutes has improved the format of the minutes, the format of the GWSRP Conference Report, and the timeliness of delivery of the report to all conference participants.
- The information in Appendix E can provide the NAVSEA GWSRP manager with a basis for initial out-year scheduling of MCR inspections for Mk 45 gun mounts.

- Integration of POT&I and MCR inspection requirements will eliminate contradictory repair and overhaul recommendations and the duplication of effort involving inspection scheduling, procedures, and personnel.

5.3.2 Recommendations

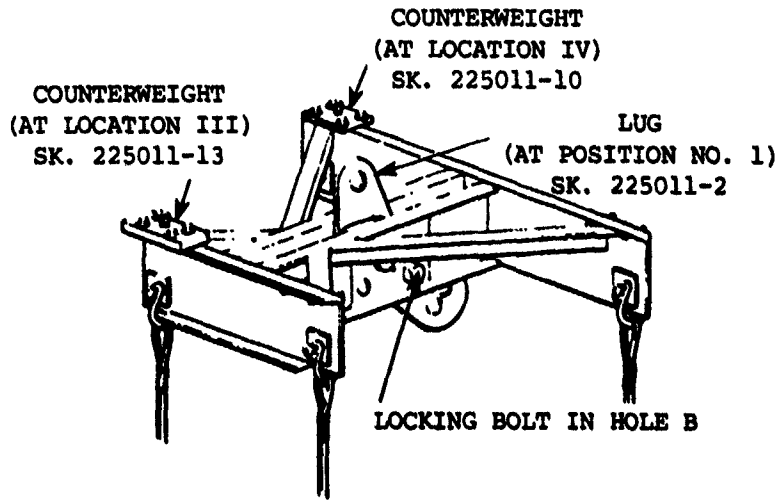
The following recommendations resulted from the GWSRP-related analyses:

- NAVSEA 62YG should continue to generate a GWSRP Conference Report based on the minutes of the semiannual GWSRP conference. This report should also include proposed agenda items for the forthcoming conference to further improve the organization of the conferences.
- The Ships' Overhaul Schedule should be monitored, and the chart in Appendix E should be updated as changes in overhaul dates occur.
- POT&I and MCR inspection documents should be integrated, with top priority given to MCR booklets for new equipment and systems.

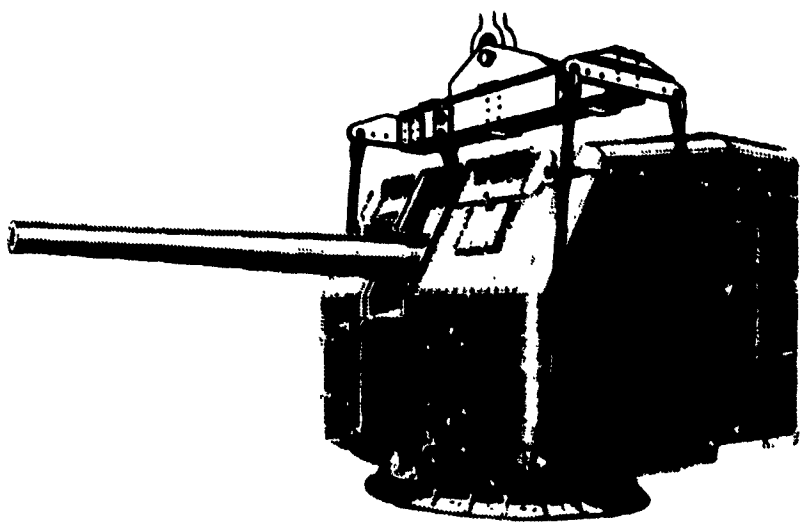
APPENDIX A

ILLUSTRATIONS OF GWSRP LIFTING GEAR

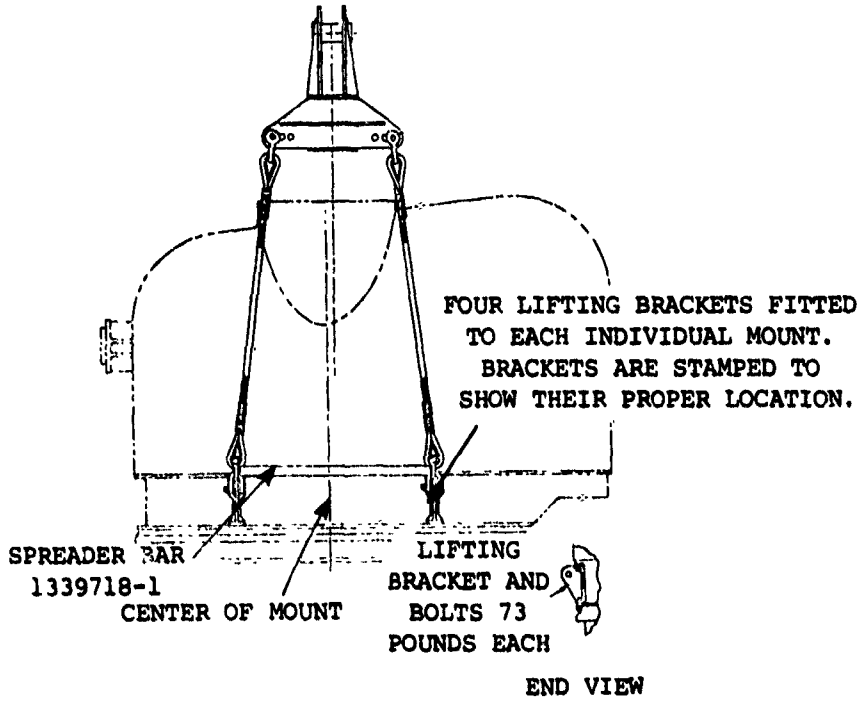
This appendix contains illustrations of the GWSRP equipment lifting gear discussed in Chapter Two.



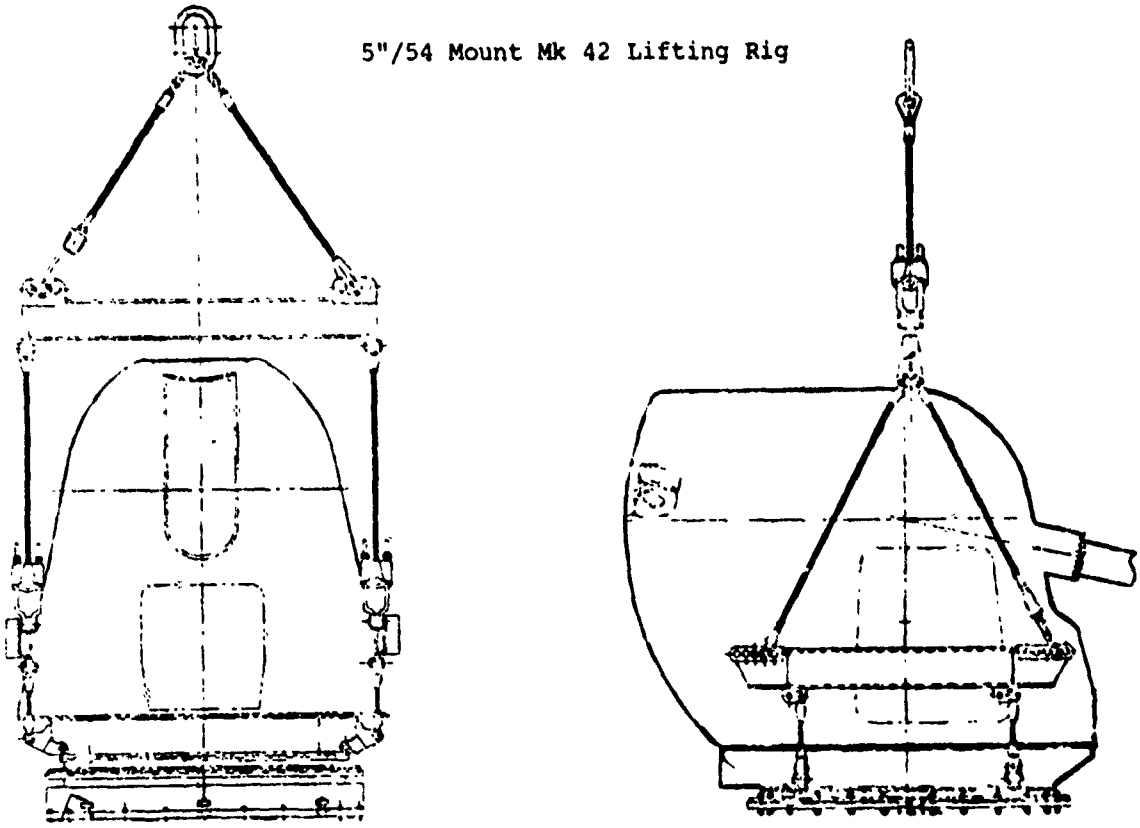
3"/50 Mount Mk 33 Lifting Rig
(Crane attachment adjusted for lifting mount less oscillating assemblies, power drives, and magazines.)



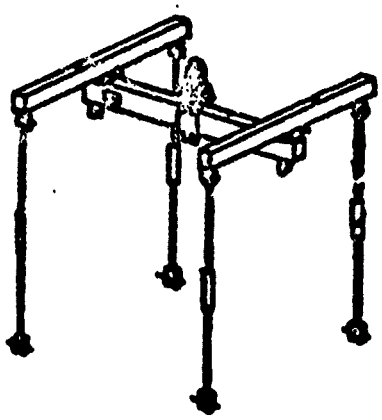
5"/38 Mount Mk 30 Lifting Rig



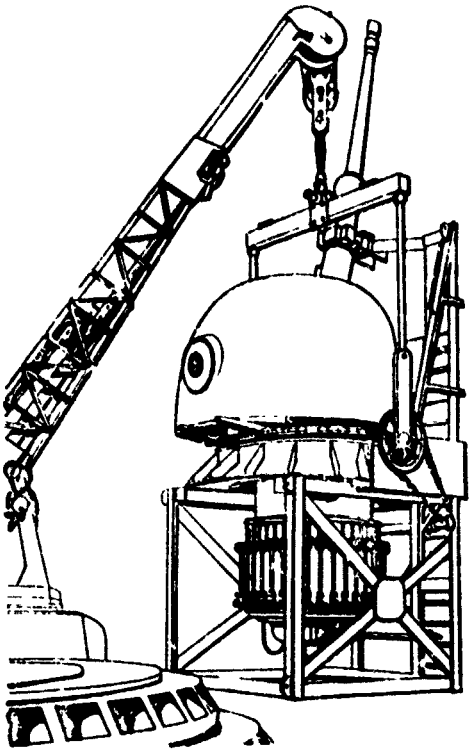
5"/54 Mount Mk 42 Lifting Rig



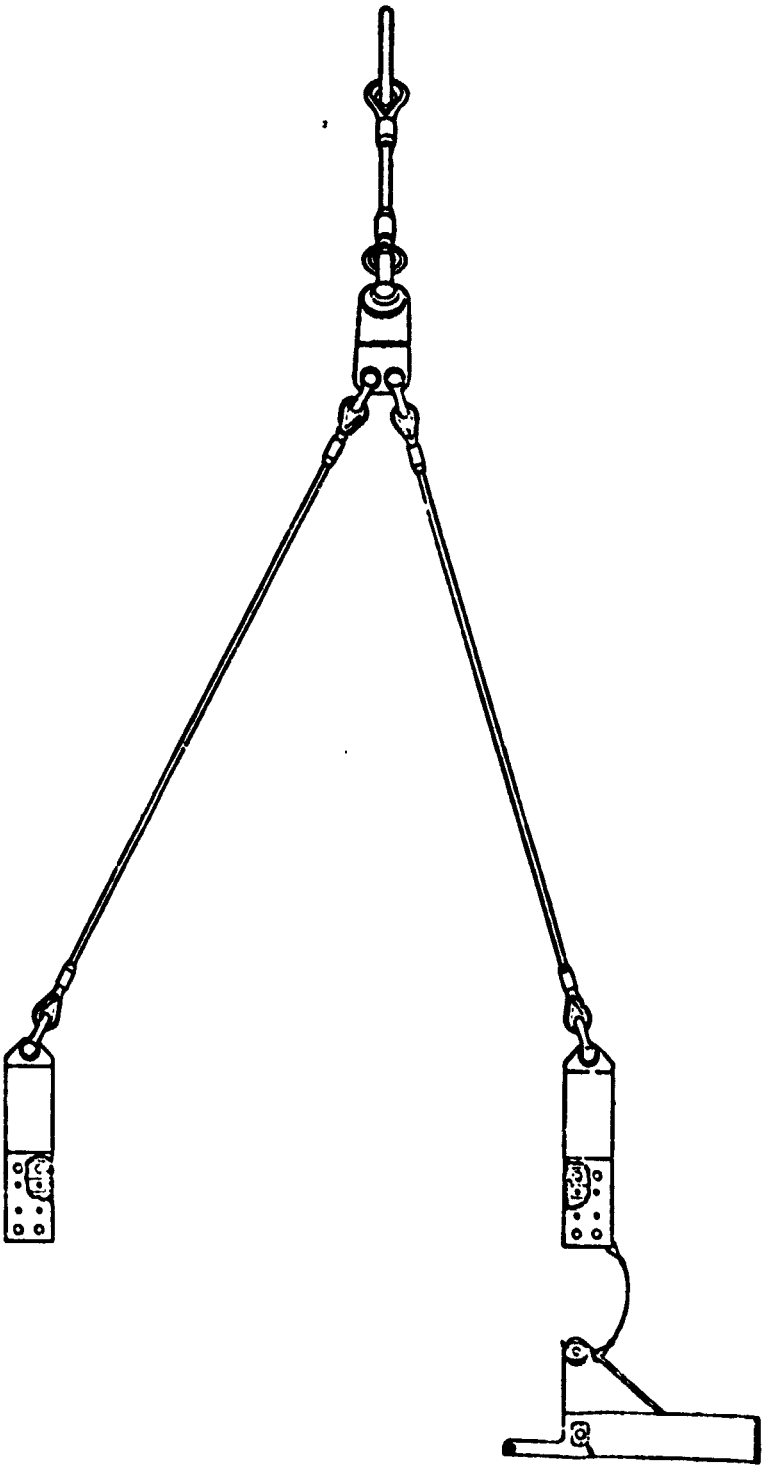
5"/54 Mount Mk 45 Lifting Rig



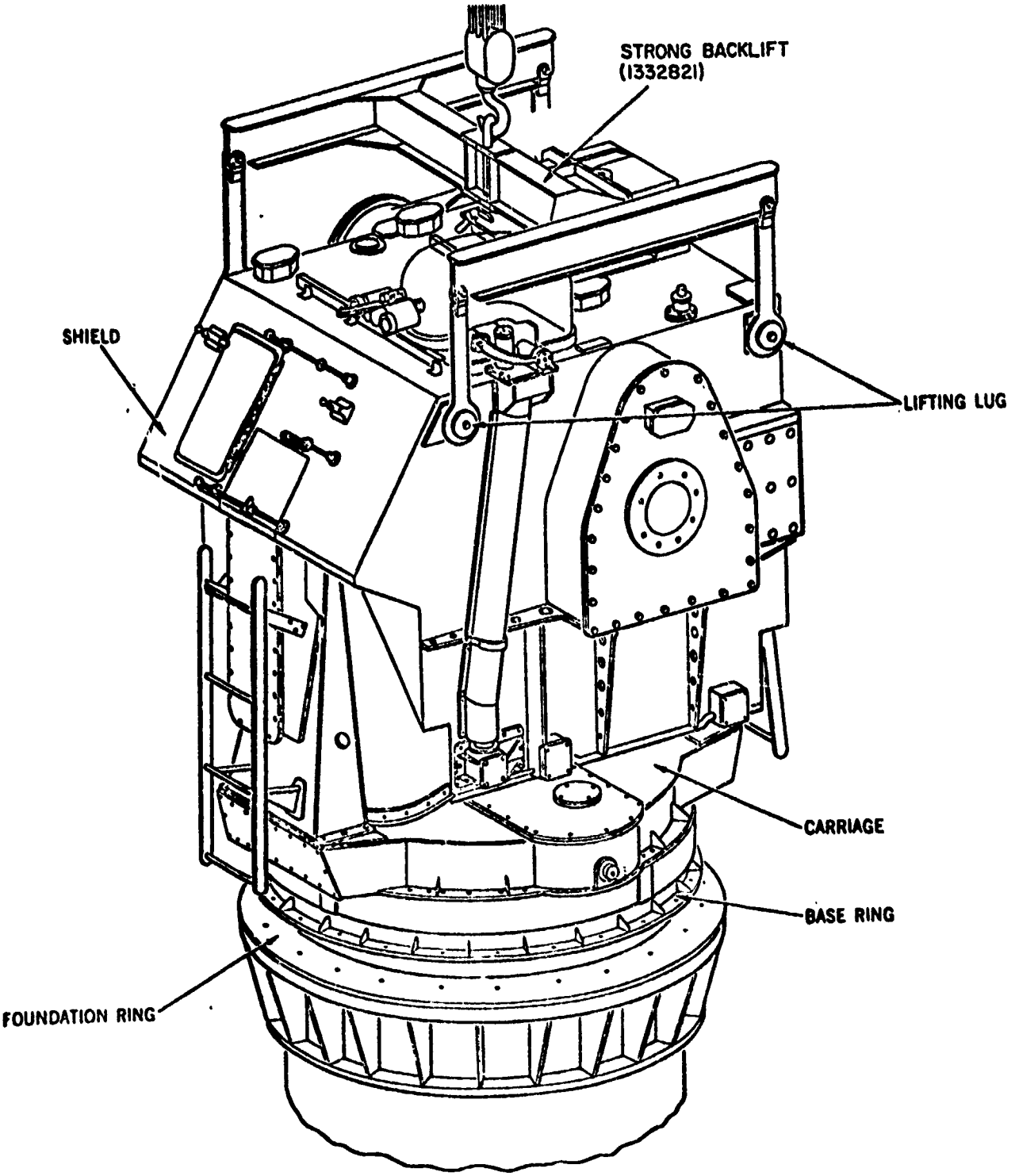
76 mm Mount Mk 75 Lifting Rig



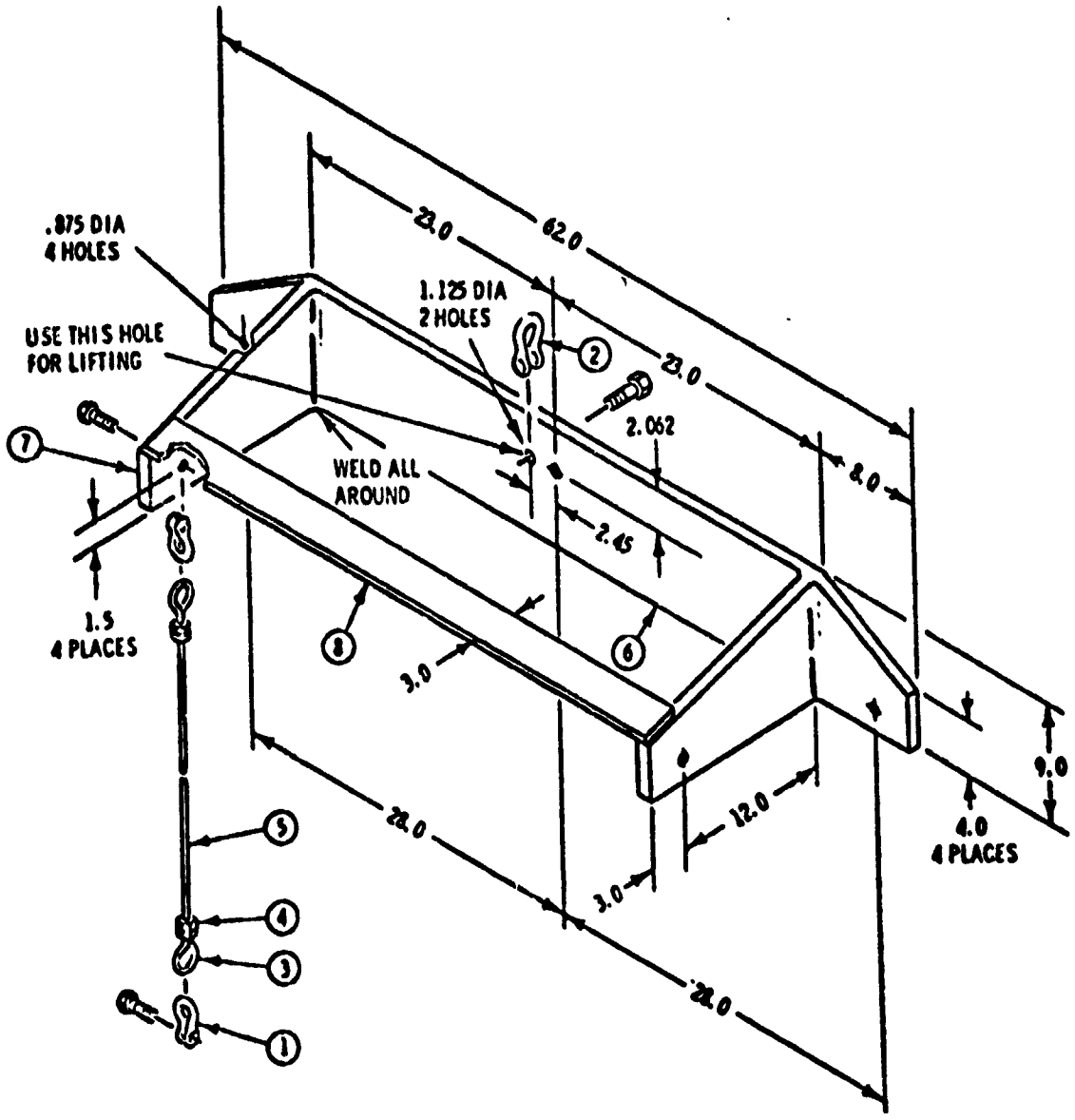
76 mm Mount Mk 75 Shipping and Handling
Fixture with Lifting Device



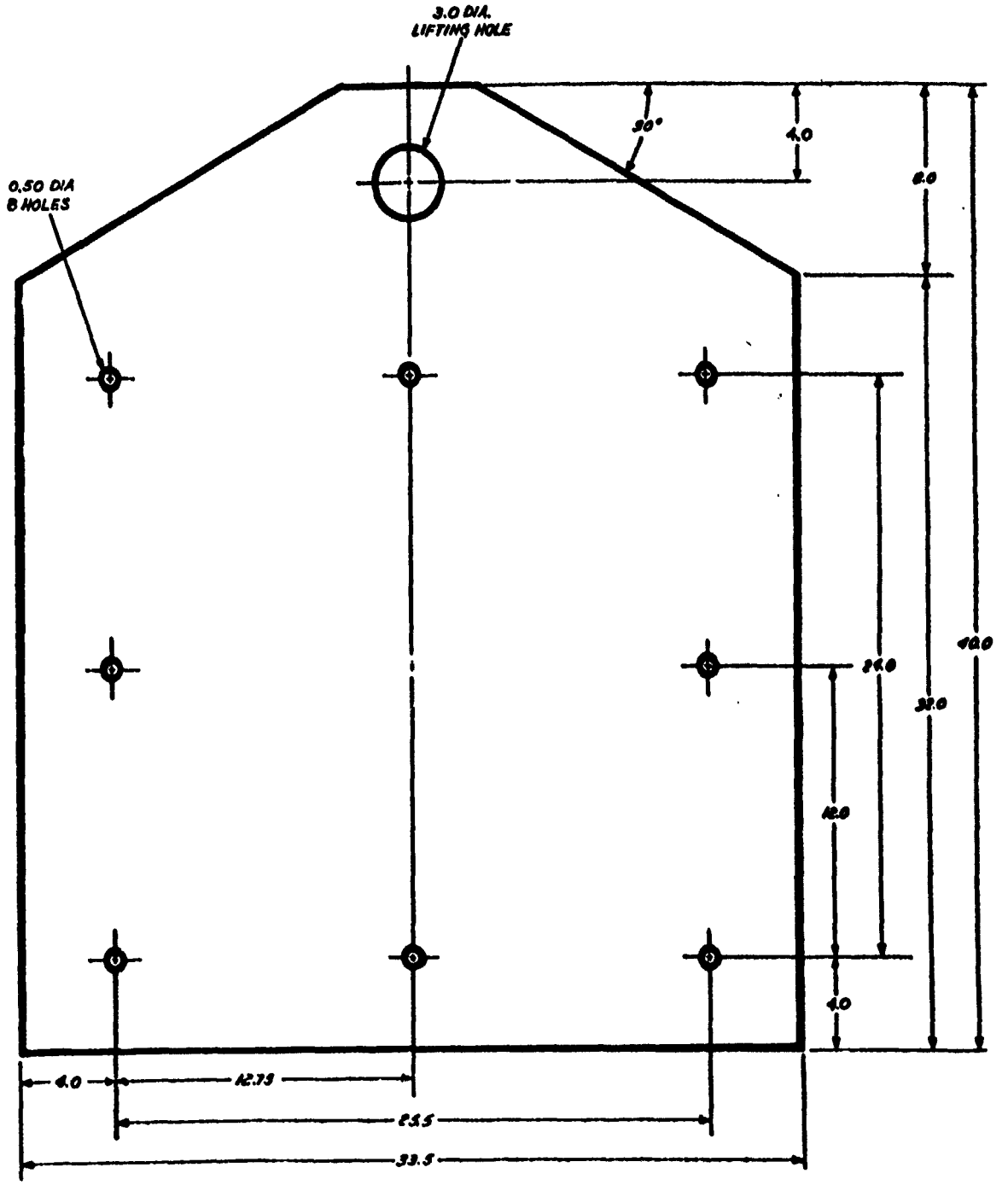
CIWS Phalanx Mk 15 Lifting Rig



Director Mk 68 Lifting Rig



AN/SPG-60 Radar Lifting Rig



AN/SPQ-9A Radar Lifting Fixture

APPENDIX B

PRELIMINARY MANAGEMENT PLAN FOR SHIPBOARD INSTALLATION OF 3"/50 GUN WEAPON SYSTEM IMPROVEMENTS

The 3"/50 GWSIP Preliminary Management Plan, ARINC Research Publication 1685-01-TR-2440, describes the policies and procedures for establishment of a structured organization dedicated to the shipboard installation of approved 3"/50 GWSIP ORDALTs. A copy of the plan is presented herein.

PRELIMINARY MANAGEMENT PLAN
FOR
SHIPBOARD INSTALLATION OF
3"/50 GUN WEAPON SYSTEM IMPROVEMENTS

May 1981

Prepared for

Director, Gun System Engineering Division
Naval Ordnance Station
Indian Head, Maryland

under Contract N00174-80-C-0438

by

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M. Hallahan

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ABSTRACT

The 3"/50 Gun Weapon System Improvement Program (GWSIP) was established by the Chief of Naval Operations (CNO) to provide a more efficient and reliable surface capability to ships equipped with 3"/50 gun mounts. This preliminary management plan describes the 3"/50 GWSIP objectives, policies, and organizational relationships concerning the shipboard installation of approved 3"/50 GWSIP ordnance alterations (ORDALTs). It also documents procedures for reporting completed ORDALTs and assessing programs and provides a structured management system to guide shipboard installation of the 3"/50 GWSIP.

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CONTENTS (continued)

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

In July 1976, the Chief of Naval Operations (CNO) directed that the primary mission of the 3"/50 gun mounts be changed from antiair warfare (AAW) to surface warfare (SUW) and that the gun mounts be improved to provide a more efficient and reliable surface capability for ships equipped with these mounts. To meet this requirement, the 3"/50 Gun Weapon System Improvement Program (hereafter referred to as the GWSIP) was established, and the Mk 2 Mod 13 Loader, the Mk 172 Mod 0 Power-Drive Amplifier, and the Mk 23 Target Designation Transmitter (TDT) upgrade/replacement were improved.

In March 1979, CNO authorized the procurement of two ordnance alterations (ORDALTs) for the 3"/50 gun mount: the Mk 2 Mod 13 Loader, designed to improve loader reliability and maintainability, and the Mk 172 Mod 0 Power-Drive Amplifier, designed to be a more reliable replacement for the existing vacuum-tube amplifier. A third alteration, the stabilized line-of-sight/line-of-fire system, is currently being evaluated.

1.2 OBJECTIVE

The objective of this plan is to provide a structured management system to guide the scheduling and completion of the approved GWSIP ORDALTs and the reporting of ship's force indoctrination.

1.3 SCOPE

This plan documents the management structure and responsibility assignments defined by Naval Sea Systems Command (NAVSEA) to support the implementation of the GWSIP. Management organization and responsibilities associated with the production of the ORDALT kits are not addressed, as they are the direct responsibility of Naval Ordnance Station, Louisville (NAVORDSTALOU). However, efforts will be coordinated between NAVSEA and NAVORDSTALOU to facilitate the successful execution of the GWSIP. Therefore, to ensure maximum efficiency and cooperation by providing insight to other activities involved in the program, the relationships between these two organizations is defined herein.

CHAPTER TWO

OVERVIEW

2.1 INTRODUCTION

Two ORDALTs have been approved and funded under the GWSIP: ORDALT 9335 (Mk 2 Mod 13 Loader) and ORDALT 9409 (Mk 172 Mod 0 Power-Drive Amplifier). Completion of ORDALT 9335 requires two major actions -- depot installation of the ORDALT into the gun mount oscillating assembly, followed by installation of the upgraded assembly aboard ship or during depot overhaul or turnaround of the gun mount. The latter action will be performed at NAVORDSTALOU for gun mounts that will be inducted into the turnaround program. The onboard installation of the improved oscillating assembly is a major undertaking, especially for those 3"/50 gun mounts which are shielded, as the shield must be removed to effect installation. Initial estimates for replacing the oscillating assembly for shielded gun mounts is 300 man-hours (MH); unshielded mounts require 100 MH. Replacing the oscillating assembly and the amplifier systems (scheduled to begin in calendar year 1982) will require a huge effort in terms of both man-hours and scope. Thus, an intense and coordinated management effort is planned to ensure that the GWSIP is successfully implemented.

2.2 PROGRAM DESCRIPTION

The 3"/50 Mk 33 Mod 0 (open twin) and Mod 13 (shielded twin) gun mounts are targeted to receive ORDALTs 9335 and 9409. Sixty-seven ship hulls are involved in the program, for a total of 147 gun mounts (excluding four training mounts). Seventy-three Mod 0 and seventy-four Mod 13 gun mounts are included in the program, for an estimated total of 29,500 MH allotted for shipboard installation of oscillating assemblies. Table 2-1 displays a breakdown, by ship class, of the number and type of gun mounts included in the GWSIP. Each mount will receive one amplifier ORDALT, for a total of 147, and two upgraded oscillating assemblies containing ORDALT 9335, for a total of 294. For simplification, both the oscillating assembly upgrade and the power-drive amplifier ORDALT will hereafter be referred to as the GWSIP ORDALTs.

Current projections indicate that installation of ORDALT 9335 will begin in FY 1981 and will be completed during FY 1986. Deliveries and installations for ORDALT 9409 will begin in FY 1982, with completion also

Table 2-1. GUN WEAPON SYSTEMS IMPROVEMENT PROGRAM

Ship Class	Number of Hulls	Number of Mounts			
		Mod 0		Mod 13	
		Gun Mounts	Man-Hours	Gun Mounts	Man-Hours
LSD-36	5	15	1,500	--	--
AE-26	4	--	--	8	2,400
AFS-1	7	2*	200	12	3,600
AGF-3	1	--	--	3	900
AS(FBM)-33	2	4	400	--	--
LST-1179	20	--	--	40	12,000
LCC-19	2	--	--	4	1,200
LKA-113	5	10	1,000	5**	1,500
LPD-1	2	6	600	--	--
LPD-4	12	23	2,300	1†	300
LPH-2	7	13	1,300	1††	300
Total	67	73	7,300	74	22,200

Training Mounts:

NAVORDSTALOU	1
Great Lakes	1
Dam Neck	1
San Diego	1
	4

4 + 147 = 151 Program Total

Total gun mounts: 147

Man-Hours:

Shipboard installations of oscillating assemblies	29,500
Shipboard installations of power drive amplifier ORDALTs	7,056
Total man-hours for shipboard installations of GWSIP ORDALTs	36,556

*AFS-5.
**One Mod 13 is installed on each ship of the class.
†LPD-4 (one Mod 13 and one Mod 0).
††LPH-12 (one Mod 13 and one Mod 0).

scheduled for FY 1986. Each installation of ORDALT 9409 will require approximately 48 MH, for a program total of 7,056 MH. Progress of GWSIP ORDALT installation over this extended period will be monitored. To this end, the GWSIP Reporting System (GRS) has been developed to provide the Gun Systems Support Office (NAVSEA 62YGD) with a means of controlling the progress of the program. The GRS will provide up-to-date information relating to GWSIP ORDALT performance and cumulative program progress. It will neither supersede nor obviate existing configuration management systems and will operate only for the duration of the GWSIP. A complete description of the GRS is contained in Chapter Four of this document.

2.3 RESPONSIBILITIES OF PARTICIPATING ORGANIZATIONS

Responsibility for coordination and management of the GWSIP is vested in the Commander, Naval Sea Systems Command. NAVSEA 62YG is the designated program manager for shipboard installation of the upgraded gun weapon systems associated with the GWSIP. NAVSEA 62YG will be supported by such activities as Naval shipyards, Shore Intermediate Maintenance Activities (SIMAs), Supervisors of Shipbuilding, Conversion, and Repair (SUPSHIPs), and Naval Sea Support Center Detachments (NAVSEACENDETs -- NAVSEACENLANT and NAVSEACENPAC) for the majority of the shipboard installations. Naval Ordnance Station, Indian Head (NAVORDSTA, I.H.), will provide management support for coordinating the program and reporting the completion of gun mount upgrades.

Production, acquisition, and shipment of ORDALT kits (hardware and software) is the responsibility of NAVORDSTALOU. In addition, NAVORDSTALOU will install improved oscillating assemblies into the mounts inducted into the turnaround program. Figure 2-1 depicts this organizational structure.

Communication among the various participating organizations is necessary to ensure proper tracking of GWSIP ORDALT kit shipments and effective operation of the GRS. To achieve efficient lines of communication for all activities involved in the GWSIP, key personnel were identified as points-of-contact for their respective activities. A compilation of these points-of-contact including organization, incumbent, code, and telephone number, is presented in Appendix A. Specific responsibilities of each participating organization are delineated in the following sections.

2.3.1 NAVSEA 62YGD

As the designated shipboard installation manager, NAVSEA 62YGD will have the following responsibilities:

- Provide GWSIP liaison with Office of the Chief of Naval Operations (OPNAV), Office of the Chief of Naval Materiel (NAVMAT), appropriate offices of Planning and Engineering for Repairs and Alterations (PERA) and NAVSEA, and field activities.
- Provide planning for the systematic installation of all GWSIP ORDALTs installed aboard ships during equipment depot overhaul or upgrade.

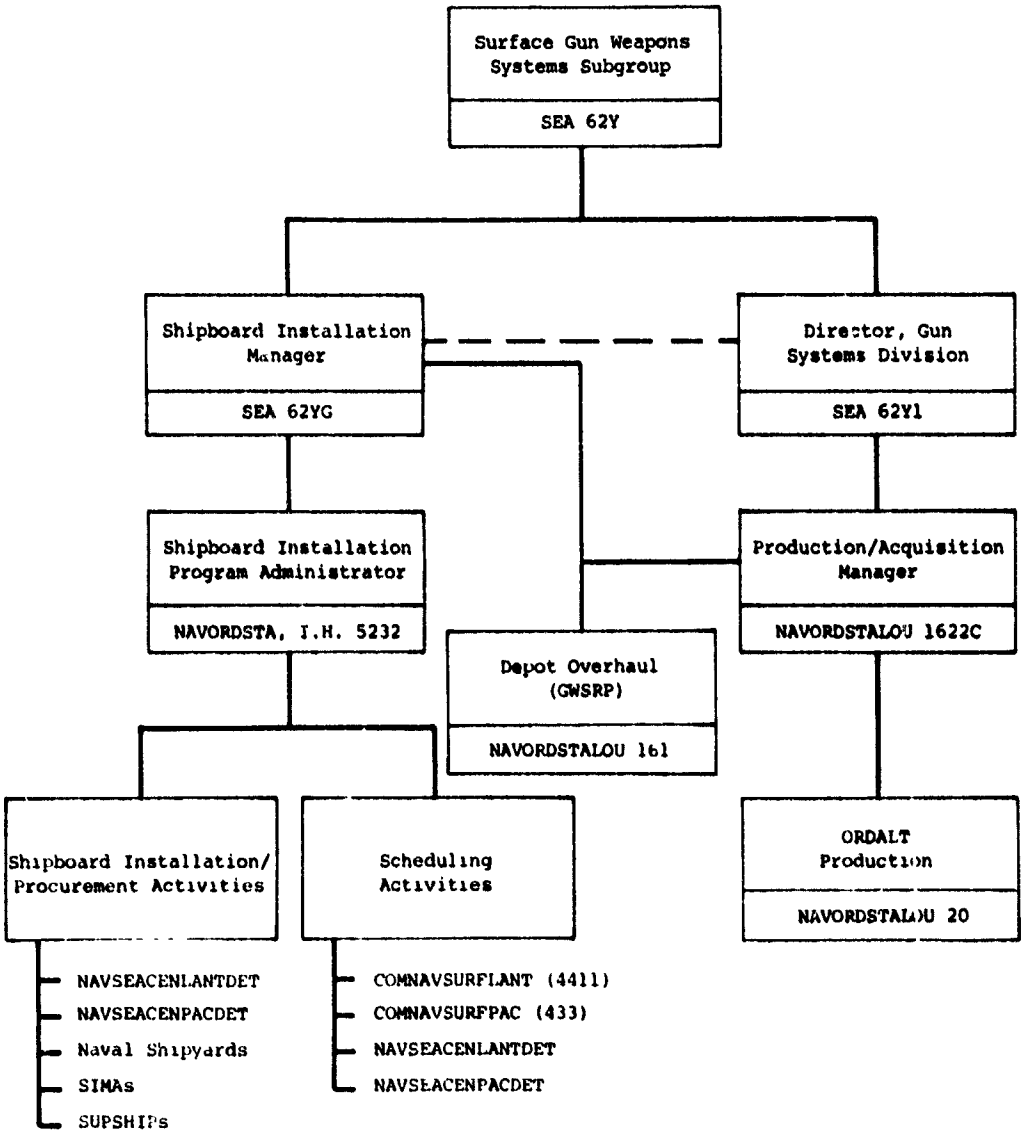

Figure 2-1. GWSIP MANAGEMENT ORGANIZATION

- Coordinate and schedule shipboard installations with appropriate Type Commanders (TYCOMs).
- Ensure that all GWSIP ORDALTs are completed on schedule and within budget constraints.
- Establish and maintain a comprehensive data system concerning GWSIP ORDALTs.
- Fund GWSIP installations.

- Maintain contact with NAVORDSTALOU to correct and modify GWSIP ORDALT delivery dates and addresses to ensure timely delivery.

2.3.2 NAVORDSTA, I.H.

As the designated program administrator, NAVORDSTA, I.H. (Code 5232H) will have the following responsibilities:

- Provide technical, financial, and administrative support to NAVSEA 62YGD as directed.
- Monitor the GWSIP and identify potential problems to NAVSEA 62YGD.
- Assist NAVSEA 62YGD in maintenance of the GRS.*
- Ensure that ship's force personnel receiving GWSIP ORDALT kits have been thoroughly informed concerning changes to the capabilities and maintenance of the GWS.
- Establish and maintain records of GWSIP ORDALTs (completed, required, and scheduled) for the fleet.

2.3.3 NAVSEACENLANT/PACDET

As the designated coordinating agents and GWSIP ORDALT installers, the NAVSEACENDETs will have the following responsibilities:

- Determine quarterly requirements for shipboard installation of GWSIP ORDALTS by integrating ship availability schedules with available manpower.
- Submit quarterly GWSIP ORDALT material requirements to NAVSEA 62YGD via NAVORDSTA, I.H.
- At the discretion of the TYCOM and NAVSEA 62YGD, act as technical coordinator during shipboard installation of GWSIP ORDALTs. Where directed, NAVSEACENLANT/PACDETs will also perform the following duties:
  - Provide technical assistance in removing equipment to be refurbished or scrapped and preparing the site to receive the refurbished equipment.
  - Ensure that all documents pertaining to the installation and operation of the refurbished equipment are delivered to the installing activity.
  - Monitor and inform all concerned of the actual arrival of refurbished equipment, including delays in arrival, if known.
  - Conduct, with the installing activity, an on-site inspection of equipment upon arrival to ascertain equipment condition and shortages.
  - Take appropriate action to obtain items identified as shortages.

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*GRS reporting procedures for each participating organization are discussed in Chapter Four.

- Provide technical assistance during the installation and check-out of refurbished equipment.
- Assist in reporting the completion of installations, documenting the ships' equipment configurations in accordance with OPNAVINST 4790.4 via OPNAV Form 4790/2K.

- Report the completion of installations through the GRS and other existing reporting systems.
- Provide NAVSEA 62YGD with a recommendation of disposition for each equipment removed (i.e., return to overhaul pipeline, retain for cannibalization, or scrap). NAVSECENDETs will also monitor and assist the Naval Supply Center in completing the disposition of the equipment identified.
- Maintain necessary liaisons with TYCOMs, ships, maintenance activities, NAVORDSTA, I.H., and NAVORDSTALOU to determine unscheduled GWSIP ORDALT requirements, and coordinate the efforts of NAVORDSTALOU and TYCOMs to integrate these requirements into the GWSIP ORDALT installation schedule.
- Coordinate contracts and work requests for contractors or Development and Training Center/Fleet Maintenance Assistance Group (DATC/FMAG), crane service, rigging, packing, and shipping of GWSIP ordnance equipment being installed or removed.
- Provide assistance to all fleet facilities on matters pertaining to the GWSIP and ordnance parts identification.
- Brief the shipboard organization on capabilities of newly installed GWSIP ORDALTs, as necessary.

2.3.4 NAVORDSTALOU

As the designated GWSIP ORDALT production manager, NAVORDSTALOU will have the following responsibilities:

- Maintain an industrial capability that will support the GWSIP ORDALT production schedule.
- Ensure delivery of equipment to appropriate addressees as directed.
- Monitor the progress of the ORDALT kits production schedule and report significant events to the shipboard installation manager.
- Report deviations from the production schedule to NAVSEA 62YGD.
- Report shipment of GWSIP ORDALT kits to NAVSEA 62YGD and the installation/procurement activity.
- Replace gun mount loaders in 3"/50 gun mounts that are inducted into the GWSRP turnaround program.

2.3.5 Naval Shipyards

As a designated GWSIP ORDALT installer, the Naval shipyard will have the following responsibilities:

- Install shipboard GWSIP ORDALTs as required by TYCOM. Combat Systems Offices (CSOs) at the various Naval shipyards will act as liaison agents with NAVSEACENDETs concerning monitoring shipments of GWSIP equipment and coordinating GWSIP ORDALT installations and ship's force indoctrination briefings.
- Report completion of installations through the GRS and other existing reporting systems as required.

2.3.6 SIMAs

As a designated GWSIP ORDALT installer, the appropriate SIMA will have the following responsibilities:

- Install shipboard GWSIP ORDALTs as required by TYCOM and act as a liaison agent with NAVSEACENDETs concerning monitoring shipments of GWSIP equipment and coordinating GWSIP ORDALT installation and ship's force indoctrination briefings.
- Report completion of installations through the GRS and other existing reporting systems as required.

CHAPTER THREE

SCHEDULING REQUIREMENTS

3.1 INTRODUCTION

Differences in manpower requirements for installation make scheduling considerations for each of the two GWSIP ORDALTs unique. Installation of the Mk 172 Mod 0 Amplifier (ORDALT 9409) is the less difficult and is categorized as a routine ORDALT that can be installed either aboard ship or during Gun Weapon System Replacement Program (GWSRP) overhaul at NAVORDSTALOU. Therefore, no special ship availability is envisioned to complete the installation. However, special considerations must be addressed for the oscillating assemblies containing the new Mk 2 Mod 13 Loader (ORDALT 9335). First, the extensive amount of time and support services needed to replace the oscillating assembly aboard ship dictates that installation must be performed when the ship will be in port for an extended period of time. Therefore, most oscillating assembly installations will be scheduled during regular overhaul (ROH) or restricted availability periods. As with ORDALT 9409, the improved oscillating assemblies can either be installed aboard ship or in gun mounts that are inducted into the GWSRP.

The large number of man-hours needed to install both GWSIP ORDALTs (36,556 MH) and the modified logistic support requirements inherent in the new loader system demand that special attention be paid to scheduling and monitoring ORDALT installations to ensure proper coordination with ship overhaul schedules and to prevent mixing gun mount configurations. The vehicle that will provide a monitoring system to control shipboard installations of GWSIP ORDALTs is the GRS, described in detail in Chapter Four.

3.2 SCHEDULING PROCEDURE

NAVSEA 62YGD, assisted by designated NAVSEA agents, is responsible for the actual scheduling of GWSIP ORDALT shipboard installations. Upon receipt and analysis of proposed installation candidates from the NAVSEACENDETs, NAVSEA 62YGD will forward equipment delivery requirements to NAVORDSTALOU, which is in charge of acquiring, producing, and shipping the GWSIP ORDALT kits. The delivery requirements will be promulgated by NAVSEA 62YGD in a letter that will direct NAVORDSTALOU to ensure that GWSIP ORDALT k' are shipped to arrive at a specific time at designated installation/pr.. rement activities. The letter will specify which ships will be having GWSIP ORDALTs

installed and which activity will be performing the installation. The expected arrival date of the shipment at the installation/procurement activity will also be specified in the letter. NAVORDSTA, I.H. and the cognizant NAVSEACENDET and TYCOM will receive an information copy of the NAVSEA delivery requirements letter to use in program administration. Figure 3-1 presents a flow diagram depicting the scheduling procedures.

3.3 PRODUCTION/INSTALLATION SCHEDULE

The scheduling procedure defined in Section 3.2 will be performed quarterly, with changes promulgated as necessary. The installation schedule will be a dynamic management tool, as it will be very responsive to changes mandated by fleet operational commitments and manpower capabilities at the waterfront. The production schedule will probably remain static (i.e., planned production goals will remain fixed) as long as shelf assets comfortably exceed installation requirements. A copy of the latest installation schedule for upgrading the Mk 2 Mod 13 Loader (ORDALT 9335) oscillating assembly is provided in Appendix B. The schedule will be extracted and replaced with the latest revision as necessary. An installation schedule for the Mk 172 Mod 0 Amplifier (ORDALT 9409) has not yet been developed. When the schedule becomes available, it will be added to Appendix B.

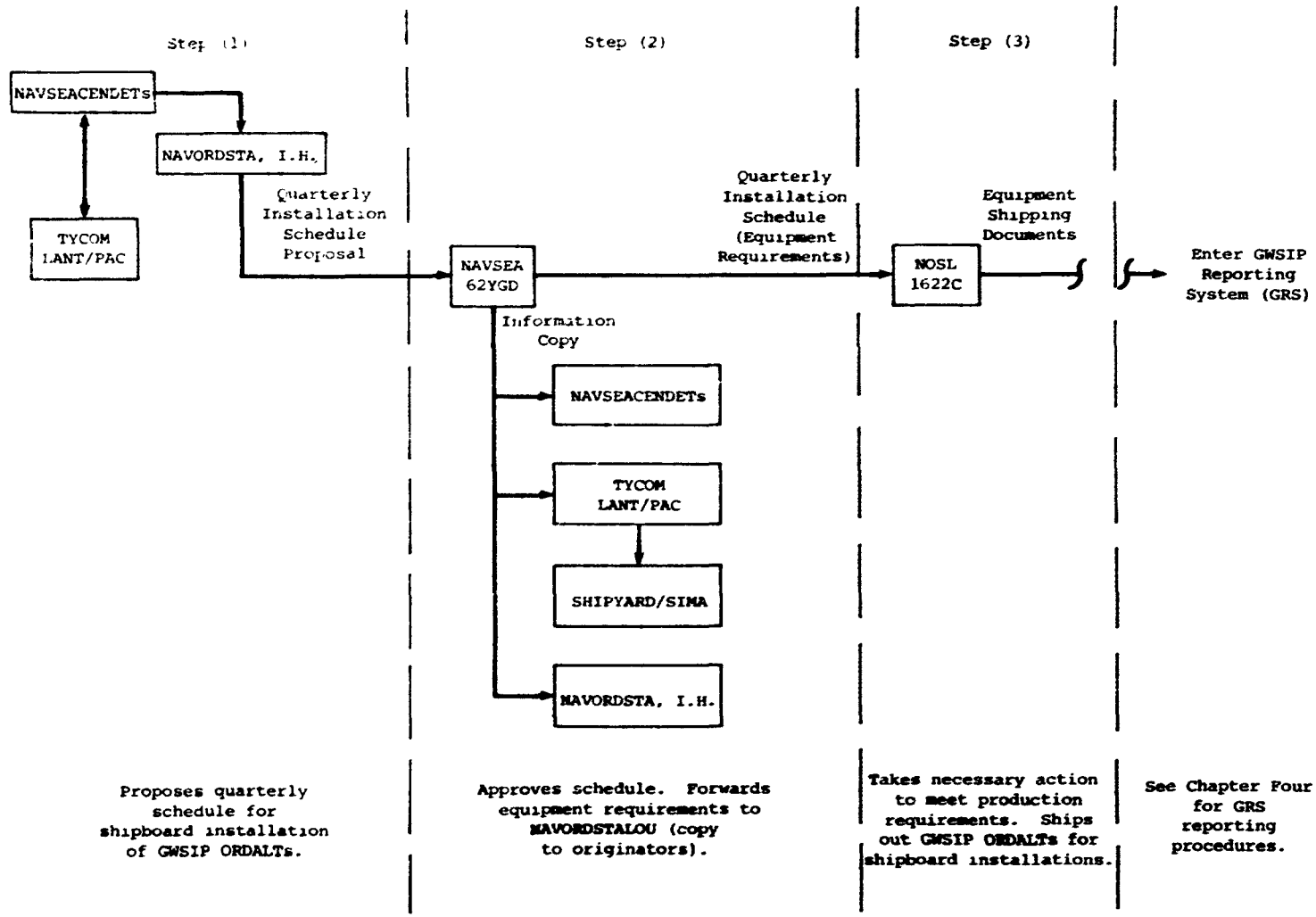


Figure 3-1. **SCHEDULING PROCEDURE FOR SHIPBOARD INSTALLATION OF GWSIP**

CHAPTER FOUR

GWSIP REPORTING SYSTEM

4.1 PURPOSE

The purpose of the GWSIP Reporting System (GRS) is to ensure that program managers are provided with the necessary information to support the planning and coordination of the GWSIP. In view of the extended period (six years) needed to complete and install all GWSIP ORDALTs, higher echelon managers must receive timely and accurate data concerning equipment shipping and completion of shipboard installations to properly plan and control the program. The GRS will acquire the aforementioned information and provide it to GWSIP managers.

4.2 SCOPE

The GRS will address various key events associated with the shipboard installation of GWSIP ORDALTs, including the shipping of GWSIP equipment from the originating facility, shipboard installation of this equipment, delivery of associated supporting software, and completion of shipboard training concerning improved capabilities and logistics support of the gun mount.

Progress of the GWSIP will be monitored by use of the GRS in reporting the completion of the above-mentioned events. Information received through the GRS will be compiled and reviewed to determine if program milestones are being met. The following section describes the organizations participating in the administration and operation of the GRS.

4.3 PARTICIPATING ACTIVITIES AND RESPONSIBILITIES

This section lists the activities involved in the GRS and summarizes their major responsibilities. Participation in the GRS should not alter an organization's responsibilities within the structure of any other information system. Rather, the GRS is intended to coordinate these agencies into a special reporting system to support planning and management of GWSIP shipboard installations. Figure 4-1 illustrates the administrative relationships of the participating activities of the GRS.

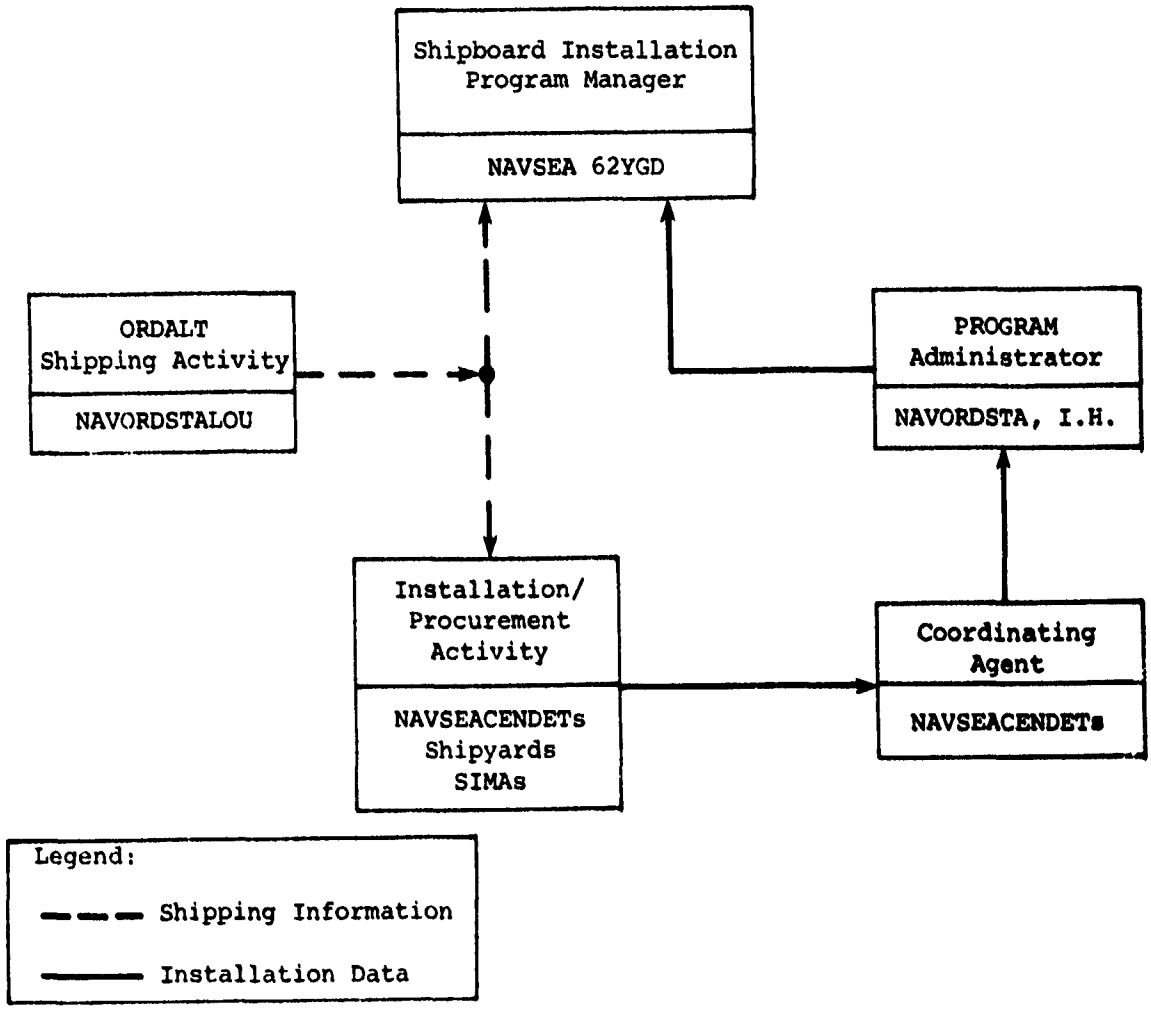


Figure 4-1. GWSIP REPORTING SYSTEM (GRS)

4.3.1 Shipboard Installation Program Manager (NAVSEA 62YGD)

As GWSIP shipboard installation program manager, NAVSEA 62YGD will provide overall program direction. The GRS will be based on completion goals as set forth in quarterly installation schedules disseminated by NAVSEA 62YGD (see Chapter Three). NAVSEA 62YGD will also review, approve, and distribute information regarding GWSIP shipboard installation status (submitted by NAVORDSTA, I.H.) on a quarterly basis.

4.3.2 ORDALT Shipping Activity (NAVORDSTALOU)

An in-service engineering agent (ISEA) function of NAVORDSTALOU is reporting shipment of GWSIP ORDALT kits. When a GWSIP ORDALT kit is shipped to an installation/procurement activity, NAVORDSTALOU will report it to

NAVSEA 62YGD and the activity receiving the consignment, using DD Form 1348-1. NAVORDSTALOU is also responsible for reporting to NAVSEA 62YGD any variance from the quarterly delivery requirements of GWSIP ORDALT kits as promulgated by NAVSEA 62YGD.

4.3.3 Installation/Procurement Activities

Naval shipyards, SIMAs, private contractors, or NAVSEACENDETs can act as an installation/procurement activity. All activities that perform a shipboard installation or a ship's force indoctrination briefing of a GWSIP ORDALT will be responsible for reporting completion to the coordinating agent. A form letter for this report, the contents of which are described in Section 4.4.2, will be provided to the various installation/procurement activities. Further guidance concerning the responsibilities of waterfront installation activities is presented in Chapter Six.

4.3.4 Coordinating Agent (NAVSEACENLANT/PACDET)

Each NAVSEACENDET will act as coordinating agent of shipboard installations for its respective coast and will be responsible for ensuring the proper completion of GWSIP shipboard installations by the installation/procurement activities. Proper completion of a GWSIP installation entails completing three objectives: (1) installation of hardware, (2) delivery of all necessary supporting software, and (3) indoctrination of ship's force. Installation of hardware includes actual equipment replacement, initial provision of shipboard spares and repair parts, and complete checkout of the gun mounts. Delivery of software includes all changes to publications related to supporting the newly installed equipment, such as Consolidated On-Board Ship's Allowance Lists (COSALs); technical manuals, such as applicable Ordnance Publications (OPs) and Ordnance Data (OD); planned maintenance system (PMS) documentation, such as maintenance index pages (MIPs) and maintenance requirement cards (MRCs); and support material lists (SMLs). Indoctrination of ship's force pertains to ensuring that ship's force has been informed concerning the capabilities, logistics, and maintenance requirements of new gun mounts.

All three objectives are addressed in the installation completion letter that is to be filled out by each installation/procurement activity and forwarded to its respective coordinating agent. The coordinating agent will review the completed letter and forward it to NAVORDSTA, I.H.

4.3.5 Program Administrator (NAVORDSTA, I.H.)

NAVORDSTA, I.H. will receive shipboard installation completion letters from the coordinating agents and will monitor the GWSIP through these letters, which will report on the status of hardware installation, software documentation changes, and training associated with the GWSIP. Discrepancies in completion status, as reported in the installation completion letters, will be addressed at this level. Problems not resolved at this level will be referred to NAVSEA 62YGD.

NAVORDSTA, I.H. will also originate the GWSIP installation status chart, which will apprise the program managers of the status of the GWSIP shipboard installations. NAVORDSTA, I.H. will submit the chart on a quarterly basis to NAVSEA 62YGD for approval. Distribution to designated participating activities will be effected by NAVSEA 62YGD. The contents of the installation status chart are described in Section 4.4.3.

NAVORDSTA, I.H. will also ensure that all installation/procurement activities associated with the GWSIP receive the GRS form letters to be used for reporting shipboard installation of GWSIP ORDALTs.

4.4 DOCUMENTATION DESCRIPTION

The GRS provides data to program managers who control and administer the GWSIP. This information is transferred via several documents. The following sections describe the different documents that constitute the GRS and discussed what their purpose is, who originates them, and who receives them.

4.4.1 Shipping Information

When a GWSIP ORDALT kit is shipped to an installation/procurement activity, NAVORDSTALOU will ensure that the shipping document, DD Form 1348-1, is transmitted to the activity and that a copy is sent to NAVSEA 62YGD. DD Form 1348-1 includes such information as shipping point, destination, item nomenclature, and Government bill of lading (GBL) number. When shipping an improved oscillating assembly, NAVORDSTALOU will include the serial number of the improved loader as part of the item nomenclature information.

This information will provide program managers with the data needed to ensure that the GWSIP ORDALT kits are traceable. To ensure timely receipt by NAVSEA of shipping notification, the shipping document must be transmitted by the shipping facility as equipment is shipped.

4.4.2 Installation Completion Letter

Each time an installation/procurement activity installs a GWSIP ORDALT aboard ship, the activity will complete an installation completion form letter and submit it to the coordinating agent. The form letter (shown in Appendix C) documents the name and hull number of the ship receiving the installation, the mount being modified (i.e., Mount 31, serial number_____), completion of mount checkout, Gun Mount Loader Mk 2 Mod 13 serial number, associated documentation changes, and the status of ship's force indoctrination or formal training. It is the responsibility of NAVORDSTA, I.H. to ensure that the letters are distributed to the installation/procurement activities in a timely manner. Each completed letter will be returned to NAVORDSTA, I.H. via the cognizant coordinating agent for use in monitoring the GWSIP and for inclusion in the GWSIP installation status chart.

The one exception to the aforementioned procedure is when NAVORDSTALOU installs an improved oscillating assembly in a 3"/50 gun mount while the mount is in the GWSRP. In this case, the installation form letter will be completed and submitted by the activity that reinstalls the gun mount on the ship. Since the NAVSEACENDETs usually provide technical assistance and supervise the performance of this task, they will complete the letters in the majority of these cases.

4.4.3 Installation Status Chart

The GWSIP installation status chart will be distributed quarterly to selected program managers for use in monitoring and administering the GWSIP. The chart will display a complete summary of shipboard installations of GWSIP ORDALTs. Data concerning scheduled installations, installations completed last quarter, installations completed to date, and remaining installations will be included. The chart will also show software changes and training conducted in association with the installation. NAVORDSTA, I.H. will compile this information and submit the resulting status chart to NAVSEA 62YGD for review, approval, and distribution to program managers. An example of this chart is shown in Appendix D.

CHAPTER FIVE

WORK BREAKDOWN STRUCTURE FOR SHIPBOARD INSTALLATION OF GWSIP ORDALTS

5.1 INTRODUCTION

The work breakdown structure (WBS) for the management of the GWSIP ORDALT shipboard installation effort is shown in Figure 5-1. This WBS will be used for coordinating, tasking, funding, and reporting program activity concerning events occurring after a GWSIP ORDALT kit leaves the depot. The WBS is function-related and is not intended to represent guidelines for management responsibility. (These have been previously presented in Section 2.3.1.) The WBS format describes a three-level management structure. Each level is defined as follows:

- Level 1 - The primary program authority involved with the scheduling, the on-board installation, and the configuration accounting of the GWSIP ORDALTs
- Level 2 - Major areas of activity required to support the GWSIP
- Level 3 - Specific task areas to be conducted by or through a Level 2 activity

The GWSIP shipboard installation WBS provides for a stand-alone organization -- separate from the hardware production activities of the depot (NAVORDSTALOU). However, there is a need to coordinate the scheduling of equipment installations with production schedules. Consequently, efforts to interface the installation organization WBS with the production organization WBS at NAVORDSTALOU will be made at the NAVSEA 62YGD level to ensure that shipboard installation requirements and production goals are compatible.

The WBS format conforms to the *Military Work Breakdown Structure for Defense Materiel Items*, MIL-STD-881A.

5.2 TASK ASSIGNMENTS

This section defines the elements shown in the WBS depicted in Figure 5-1. Each element number is given, together with a statement of task and scope.

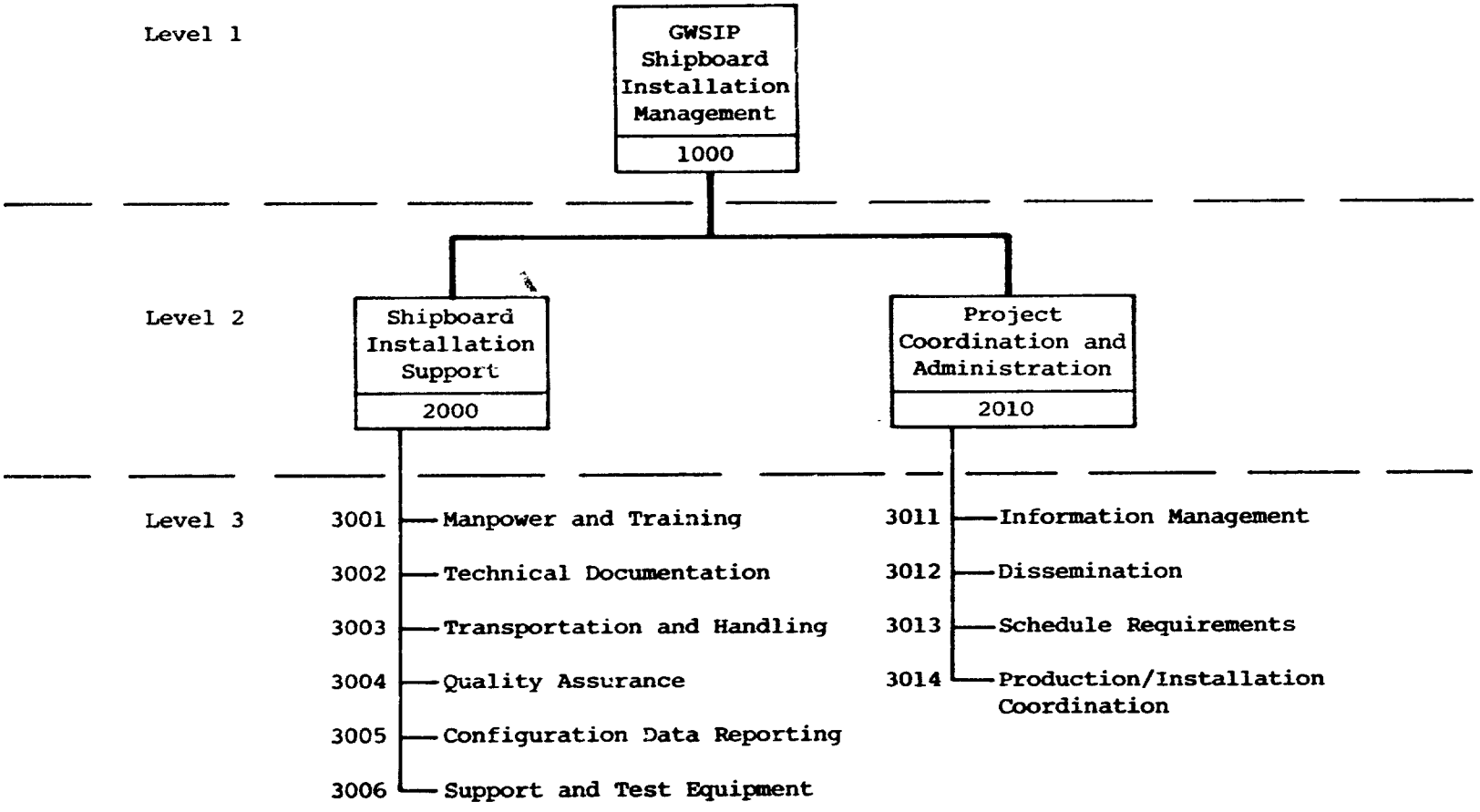


Figure 5-1. ELEMENTS OF WORK BREAKDOWN STRUCTURE FOR SHIPBOARD INSTALLATION OF GWSIP

5.2.1 Element 1000: Shipboard Installation Management

Element 1000 includes the total effort involved in the actual shipboard installation of the GWSIP ORDALTs. Specific tasks include coordinating installation schedules and ORDALT kit production schedules, tracking GWSIP ORDALT kits from depot to installation aboard ship, and maintaining configuration data throughout the duration of the program. Funding of shipboard installations and management support functions is also included, as well as providing a liaison with higher authority concerning the GWSIP.

5.2.2 Element 2000: Shipboard Installation Support

Element 2000 deals with the actual on-board installation of the GWSIP ORDALTs and includes technical assistance to be provided during scheduling, installation, checkout of refurbished equipment, logistics support, and completion reporting.

5.2.3 Element 2010: Project Coordination and Administration

Element 2010 includes the execution of the GWSIP shipboard installation effort and ensures promulgation of the policy and directives of a higher authority. Also included are the organization planning, information distribution, and site coordination required for program implementation. Element 2010 also assists shipboard installation management (Element 1000) in the development of program requirements with respect to scheduling GWSIP equipment change-outs and maintaining the GRS.

5.2.4 Element 3001: Manpower and Training

Element 3001 consists of the administration and management of industrial manpower resources (capability and capacity) required to support shipboard installations of GWSIP ORDALTs. It also includes indoctrinating shipboard personnel concerning the capabilities of the improved loader and amplifier and the availability of formal schools.

5.2.5 Element 3002: Technical Documentation

Element 3002 includes the distribution (from installing activity to user activities) of revised technical documentation necessary for operation and maintenance of the improved loader and amplifier.

5.2.6 Element 3003: Transportation and Handling

Element 3003 consists of the management of the procedures, equipment, facilities, and manpower resources used for moving and handling materials and equipment associated with the GWSIP.

5.2.7 Element 3004: Quality Assurance

Element 3004 includes the monitoring of installation operations to ensure that installation and checkout procedures are properly followed and that equipment is delivered in acceptable condition.

5.2.8 Element 3005: Configuration Data Reporting

Element 3005 consists of preparing and submitting required installation completion reports in accordance with GRS procedures.

5.2.9 Element 3006: Support and Test Equipment

Element 3006 includes the support and test equipment required for installation, checkout, calibration, and other required system checks in support of shipboard installation of GWSIP ORDALTs.

5.2.10 Element 3011: Information Management

Element 3011 consists of management support to oversee the implementation and operation of a configuration accounting system and to monitor the progress of shipboard installations. It also includes the compilation of data required for monitoring the completion of installation and shipboard indoctrination.

5.2.11 Element 3012: Dissemination

Element 3012 includes the preparation of installation and shipboard indoctrination completion data for required status reports. It also provides information to configuration data reporting (Element 3005) to identify additional user requirements.

5.2.12 Element 3013: Schedule Requirements

Element 3013 includes the development of a program installation schedule and analyzes such factors as work level, manpower, ship and hardware availability, and budget limitations.

5.2.13 Element 3014: Production/Installation Coordination

Element 3014 consists of management support to ensure that hardware production schedules will meet or exceed installation requirements. It also includes development of a communication network between the ISEA, the shipboard installation manager, and the various installing activities.

CHAPTER SIX

PROGRAM SUPPORT

6.1 ADMINISTRATIVE COORDINATION

Implementation of the GRS and the coordination of installation schedules and training requirements with the various installing activities will require considerable management support. The management plan for the GWSIP defines the organizational responsibilities and denotes the actions to be taken so that proper control can be exercised concerning the shipboard installation of GWSIP ORDALTs. NAVORDSTA, I.H., with on-site assistance from the NAVSEACENDETs, will administer the management plan and monitor the progress of the shipboard installations. Information concerning the operation of the GRS and the progress of the overall program will be forwarded from the waterfront sites to program headquarters via NAVORDSTA, I.H. Dockside installation will be coordinated with ship ROH scheduling to prevent configuration mixing.

Reports will be generated and disseminated by NAVORDSTA, I.H. Program directives and quarterly installation schedules will be issued by NAVSEA 62YGD.

6.2 WATERFRONT INSTALLATION TEAMS AND RESPONSIBILITIES

Shipboard installation of the GWSIP ORDALTs will be conducted by numerous activities. Installation teams may be composed of personnel from Naval shipyards, private shipyards, NAVSEACENDETs, or private contractors. An installation team will nominally be composed of three-man crews, excluding support personnel such as riggers and crane operators. The installation teams are responsible for properly installing the GWSIP ORDALTs. Before an installation operation, the installation team will ensure that the necessary hardware supply spares and software are on-site to effect appropriate installation and ship's force indoctrination. Revised PMS documentation will be provided by the Maintenance Management Department (Code 914), NAVSEACENLANTDET, Norfolk, Virginia. The shipboard installation program manager will coordinate installations of both the amplifier and the improved oscillating assembly with the indoctrination briefing of shipboard personnel, so that both activities occur concurrently aboard ship, thus increasing the efficiency of the installation teams and decreasing demands on ship availability.

In addition, installation teams will be required to report completed installations through the newly developed GRS (explained in Chapter Four). This requirement will not eliminate current reporting requirements.

Waterfront installation teams will interact with various reporting systems in support of improvement requirements for GWSIP hardware and software. As mentioned in the preceding section, installation teams will report completed change-outs through the GRS. Additional software requirements, such as ensuring that all supporting technical manuals are delivered and that shipboard indoctrination briefings are conducted, must be reported and verified. This will require installation teams to work with their appropriate NAVSEACENDET representatives to ensure completion of those requirements. If deemed necessary by the shipboard installation manager, a special team may be organized to ensure that shipboard indoctrination is conducted during an installation operation. The waterfront installation team will have to interact with the special indoctrination team to ensure that training and installation operations are coordinated. The installing activity will be responsible for notifying NAVORDSTA, I.H. (via its respective NAVSEACENDET) in the event of nondelivery of an expected GWSIP ORDALT kit. This information will be directly relayed from NAVORDSTA, I.H. to NAVSEA 62YGD for resolution.

6.3 TRAINING REQUIREMENTS

Training requirements concerning shipboard installations of GWSIP ORDALTS exist at two levels. First, the installers must be trained in the installation of the oscillating assembly. Second, ship's force requires both formal schooling and a briefing to indoctrinate gun crew personnel as to maintenance and changes in capability of the improved gun mount. The depth and detail of the indoctrination briefing will depend on whether or not ship's force personnel have attended formal schooling.

6.3.1 Installation Team Training

Initial training has been provided for NAVSEACENLANT/PACDET and representatives of Mobile Technical Units (MOTUs) Two and Five during installation and checkout (I&C) of the ORDALT oscillating assemblies at Fleet Combat Training Center Atlantic (FCTCL), Dam Neck and Fleet Training Center (FTC), San Diego. These personnel will either perform the actual shipboard installations or provide technical assistance to the shipboard or private contractor as requested by TYCOM. In addition, a new OP has been prepared by NAVORDSTALOU to describe the I&C procedures to be followed when replacing the 3"/50 gun mount oscillating assembly. This OP will be provided to the installing activity concurrent with delivery of the replacement oscillating assembly.

6.3.2 Ship's Force Training

A preliminary indoctrination briefing will be required during the actual installation to apprise ship's force of the new capabilities and

maintenance procedures affected by the GWSIP equipment improvements. Information as to the availability of formal training, if required, as well as the delivery of supporting software (updated OPs, PMS, and supply documentation), will also be provided to ship's force as part of the indoctrination briefings.

6.3.3 Training Documentation Procedures

Ship's force training, whether conducted before installation of the GWSIP ORDALTs (formal schooling) or concurrently (shipboard indoctrination briefings), must be verified to the shipboard installation program manager via the installation completion letter. It will be the responsibility of the installation team or the special indoctrination briefing team (if deemed necessary by the shipboard installation manager) to submit the report upon completion of a GWSIP replacement operation. Negative reports will also be required. All reports are to be mailed to NAVORDSTA, I.H. via the cognizant NAVSEACENDET.

APPENDIX A

KEY GWSIP SHIPBOARD INSTALLATION PARTICIPANTS

Table A-1 lists key points of contact for organizations participating in the shipboard installation of GWSIP ORDALTs.

Table A-1. KEY GWSIP SHIPBOARD INSTALLATION PARTICIPANTS

Organization	Name	Code	Commercial Telephone Number	AUTOVON
Naval Sea Systems Command				
Director Gun System Division	CDR P. L. Sovey	SEA-62Y1	202-692-1834	222-1834
GWSIP Shipboard Installation Manager	S. Reading	SEA-62YGD	202-692-8896	222-8896
Technical/ILS Manager	B. D. Gray	SEA-62Y11H	202-692-1832	222-1832
NOS Louisville				
NOSL GWSIP Program Manager	C. Shelly	1622C	502-367-5207	989-5207
NOS Indian Head				
GWSIP Information Manager	G. Johnston	5232H	301-743-4455	364-4455
Naval Sea Support Center Atlantic Detachment				
3"50 Gun Mount Liaison	J. Hudson	620	804-393-7911	961-7911
	R. Harris	91B	804-393-7677	961-7677
Naval Sea Support Center Pacific Detachment				
3"50 Gun Mount Liaison	C. Westfall	200	714-225-4625	957-4625
	K. Fisher	200C	714-225-4145	957-4145
COMNAVSURFLANT				
Type Commanders Desk	J. O'Brien	4411	804-444-5911	690-5911
COMNAVSURFPAC				
Type Commanders Desk	LCDR R. Uttich	433	714-434-9747	958-9747
Naval Shipyards Combat Systems Offices				
Philadelphia	A. Shoroman	191.1	215-755-3561	443-3561
Norfolk	N. Shumate	191.1	804-393-5088	961-5088
Charleston	W. Barnett	196.1	803-743-2992	794-2992
Long Beach	B. Allen	191.2	213-547-6541	360-6451
Puget Sound	T. Thayne	191.12	206-478-2519	439-2519
Pearl Harbor	R. Loo	191.21	808-471-8336	--
Mare Island	R. Manyes	191.14	707-646-3234	253-3234
Shore Intermediate Maintenance Facilities		Shop		
Mayport	LT P. Clausen	10A	904-246-5140	960-5140
Little Creek	LT Carpenter	10A	804-464-8103	680-8103
Norfolk	LTJG J. Kurek	10A	804-444-3966	690-3966
Charleston	LCDR R. Hudgens	10A	803-743-2673	794-2673
San Diego	CWO J. Kane	10A	714-235-2418	958-2418
Pearl Harbor	CWO R. David	10A	808-471-3147	--

APPENDIX B

ORDALT PRODUCTION AND INSTALLATION SCHEDULES

Figure B-1 shows production and installation schedules for ORDALT 9335, Mk 2 Mod 13 Loader. A similar schedule for ORDALT 9409, Mk 172 Mod 0 Power-Drive Amplifier, will be added when available.

Fiscal Year	1980						1981												1982								
Calendar Year	1980						1981												1982								
Month	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
Production		2		3	2	4	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Cumulative Delivery		2		5	7	11	15	19	23	28	33	38	43	48	53	58	63	68	73	78	83	88	93	98	103	108	113
Training Installations			(2) NOSL		(3) Dam Neck	(2) San Diego	GWSRP Installations																				
							(2) LPH 12 (Mod 13)																				
							Waterfront Installations																				
							(2) LPH 12 (Mod 0)																				

Figure B-1. ORDALT 9335 PRODUCTION AND INSTALLATION SCHEDULES

APPENDIX C

FORMAT FOR INSTALLATION COMPLETION LETTER

Figure C-1 is a sample of the installation completion letter to be used in the GWSIP Reporting System (GRS).

(Installing Activity) _____ (Ship Name and Hull Number)

(Mount Location) _____ (Serial Number)

Installation Completed:	Incomplete	Complete
Oscillating Assembly with ORDALT 9335:		☐
Mk 2 Mod 13 Loader Serial Number:		
Left Gun _____		
Right Gun _____		
ORDALT 9409		☐
Documentation Changes	☐	☐
Training:		
Formal School	☐	☐
Shipboard Indoctrination	☐	☐
	Unsatisfactory	Satisfactory
Mount Checkout	☐	☐

Comments (Explain incomplete or unsatisfactory marks):

_____
(Signature and Title)

Figure C-1. SAMPLE GRS INSTALLATION COMPLETION LETTER

APPENDIX D

FORMAT FOR INSTALLATION STATUS CHART

Table D-1 is a completed sample of the installation status chart to be used in the GWSIP Reporting System (GRS).

Table D-1. SAMPLE GRS INSTALLATION STATUS CHART

GWSIP Installation	Scheduled Last Quarter	Shipped Last Quarter	Installed Last Quarter	Installed to Date	Percent Completed	To be Installed	Scheduled This Quarter
Oscillating Assembly with ORDALT 9335	8	8	8	27	12.4	147	11
ORDALT 9409	4	4	3*	41	22.9	147	10
Comments: *Operational schedule change; rescheduled for third quarter of 1982.							

Documentation Changes	Completed Last Quarter	Incomplete Last Quarter	Completed to Date	Percent Completed	Changes Remaining	Scheduled This Quarter
Oscillating Assembly with ORDALT 9335	8	0	27	12.4	191	11
ORDALT 9409	3	1*	~1	22.9	138	10
Comments: *Operational schedule change- rescheduled for third quarter of 1982.						

Ship's Force Indoctrination Status	Completed Last Quarter	Incomplete Last Quarter	Completed to Date	Percent Completed	Indoctrination Remaining	Scheduled This Quarter
Oscillating Assembly with ORDALT 9335	8	0	27	24.7	82	8
ORDALT 9409	8	0	27	24.7	82	8

Ship's Force Formal Training	Attended to Date	Formal Training Remaining	Percent Completed
Oscillating Assembly with ORDALT 9335			
ORDALT 9409			
Comments:			

First CY Quarter 1982 Year

APPENDIX C

GUN WEAPON SYSTEM REPLACEMENT PROGRAM CONFERENCE REPORT -- FALL 1980

This appendix contains a report summarizing the opening remarks, program status, and action items discussed in the GWSRP conference of November 1980.

GUN WEAPON SYSTEM REPLACEMENT PROGRAM
CONFERENCE REPORT

FALL 1980

OPENING REMARKS

CDR H. H. Neuhard, NOSL Planning Officer, opened the conference on behalf of the Commanding Officer. In his remarks CDR Neuhard apprised the attendees of a comment that was made at the recent shipyard commanders conference that "ship overhauls are not doing well enough and could do better." In addition, CDR Neuhard emphasized that NOSL has a requirement to improve compliance with delivery dates. It is intended that this be accomplished by: not agreeing to something you cannot do, making certain the agreements are firm in advance, and establishing the earliest scheduling possible to allow the customer to make decisions by providing realistic alternatives.

The federal hiring freeze anticipated in mid-January 1981, will adversely affect NOSL to the extent of 500 man-months of productivity. This figure is based upon past year's attrition rate of 15 per month, and in 1980 a rate of 20 men per month. This number of lost man-months converts to approximately 76,680 productive man-hours.

NAVSEA 62YG, Mr. Art Romano, presented a summary of gun conferences from 1972 to the present. A specific review of both current and future programs was presented as follows:

GWSRP. This program was initiated in 1964 and allows the fleets to make recommendations on the induction of specific ordnance elements into the overhaul program. The process of induction of an equipment into GWSRP is the result of an actual on-site inspection and data feedback from the fleet to the Type Commanders (TYCOMS). The TYCOM then consolidates a list of equipments for induction. This list is reviewed at the GWSRP conference and generates a tentative overhaul schedule for both the upcoming fiscal year and for outyear planning. At present the major constraints limiting the numbers of equipments inducted are actual available dollars (Budgetary), and NOSL industrial capacity.

The ordnance readiness issue has made a major impact on GWSRP and continues to receive significant attention in NAVSEA and OPNAV. Efforts by NAVSEA 01 and 06 have generated increased visibility and improved the ordnance readiness posture. Through the efforts of NAVSEA, additional OPN funds became available late in FY-80. These funds were used to augment the

O&MN funds that normally support the GWSRP. The readiness issue will be seen as a continuing task, in addition to our basic commitments.

Close-In Weapons System (CIWS). We are currently building a capability, at NOSL, to overhaul certain components and modules of the CIWS, with initial efforts scheduled to commence in FY-82.

The expansion of building capacity and procurement of test equipment, both funded by O&MN, are currently underway. It is intended that NOSL will commence depot-level overhauls in FY-86.

MK 75/76 MM Gun Mount. This gun was originally manufactured by FMC/ Northern Ordnance Division, under license from OTO Melara. Long range planning has commenced with the intent to establish NOSL as the DOP.

MK 45 5"/54 Lightweight Gun Mount. NOSL should start receiving the Lightweight Gun Mounts in FY-81 with a sharp increase in the number inducted occurring in FY-83.

MK 86 Fire Control System. The FCS MK 86 are now being upgraded during ship overhaul periods. The mechanical above-decks equipments are being done at Seal Beach, CA for West Coast ships and at Lockheed Electronics Company for East Cost ships. The overhaul of below decks units is being performed at NWSC, Crane, ID.

APA to NSF Transfer. All 4N and 6U cog material will be transferred from APA to NSF on 1 April 1981. This account change will drastically alter our method of operations due to the end user now being required to provide funds for material used.

In conclusion, NAVSEA 62YG requested that the Executive Scheduling Committee convene following the general business discussions by ISEA, fleet and support activities. The results of the executive committee will be promulgated in the monthly update of the GWSRP schedule.

Following Mr. Romano's remarks, individual program managers from NOSL presented a status report of their programs. A condensed status of these programs is as follows:

5"/54 MK 45 Lightweight Gun. NOSL 501 presented a review of the major problems currently encountered in the MK 45 gun program. The two major problems are fasteners and power supplies. We are continuing to have problems with bolts, but the final-configuration bolt should be delivered by the end of November 1980, with an anticipated delivery to the fleet in February 1981. Testing is continuing at Dam Neck and to this date the testing has proven that the new bolts meet the strength test, and that the failures that have occurred thus far were cycle failures.

The second continuing problem with the 5"/54 Lightweight Gun is with the power supplies in the EP-1 and EP-2 panel. While the actual power supply failure rate is only 8%, there are no carcasses in the pipeline, and there are no piece parts available to repair defective units in the supply system.

The first approach to this problem has been the refurbishment of available carcasses at NOSL. NSPCC is attempting to fill the pipeline with piece parts and when the carcasses are reworked, the refurbished unit will be returned to the supply system. The NSPCC representative also stated that replacement power supplies are on order from the manufacturer, but have not yet been funded. 62YG will look into the funding problem.

MK 75/76MM Gun Mount. NOSL Code 501 conducted this presentation. There are three major recurring problems in the MK 75/76 MM Gun Mount which are proximity switches, star wheel assemblies, and power drive motors.

The problem with the proximity switches has partially been corrected with the installation of a new design switch. The installation of fail-safe circuitry in the load-cycle, that assures shutdown of the system in the event of a switch failure instead of allowing it to continue, was discussed. NOSL 501 is to investigate this possibility further.

The problems encountered with the starwheel assembly are attributed to improper adjustment. A new MRC is being prepared which defines tolerance and procedures more clearly.

The power drive motors are failing due to an excessive heat build-up that is a result of the motors being too small for the job they are doing. A new motor is being considered, but is a few years away. Additionally, suggestions were made to add protective fuses, improve the sliding surfaces, use a higher voltage motor, as well as investigate changing to a completely new motor.

The basic OP for the MK 75 gun mount should be out in approximately 12 months, with pen and ink changes to reflect ORDALT status.

A discussion of the overhaul concept for the FFG-7 ship class followed with concern expressed regarding the need for extra MK 75 guns from SEA-62Y. The FFG-7 class ships are scheduled for 10-year overhaul cycles and the general feeling was that the guns will not last that long, i.e., with a total population of 75 gun mounts, extra mounts possibly in a rotable pool, are needed to accommodate a turnaround program.

5"/54 Mk 42 Mod 7 Gun Mount Supply Support Status. NOSL Code 501 reported that the list of unsupported assemblies, that was prepared at the last meeting, was prioritized and provided to Field Service to identify those assemblies most needed by the Fleet. NOSL Field Services identified 40 assemblies and from this listing, NSPCC determined that 11 assemblies were not adequately supported. A letter was prepared from NOSL to NAVSEA identifying carcasses at NOSL and Crane that can be brought to a Class "A" condition. The letter also provides cost estimates, manpower requirements, etc.

Guided Projectile. The Loader Select Modification to 5"/54 Mk 45 mount was installed on USS BRISCOE DD-977 this fall. During the installation of this ORDALT a modification was made to the valve block and housing to allow for physical interference caused by valve and breech block changes necessary for GP. The interference was caused by the addition of switches and actuators on the loader that are provided to identify the type of ammunition in the cells. The GP ORDALT will be applicable to all classes of ships having the Mk 45 gun mount except the LHAs.

Logistic support for the GP modification is underway. The MRC changes have been made but require additional work. The onboard repair parts package, made up of spares as determined by NOSL and NSPCC, will be provided with each installation. The drawings in the logistic support guide are also undergoing necessary modifications.

IMPROVEMENT/OVERHAUL PROGRAM STATUS

3"50 GWSIP. The 3"/50 GWSIP consists of providing new loaders ORDALT 9335, and new amplifier ORDALT 9409. ORDALT 9335 consists of replacing the older three-sprocket loader with a new two-sprocket loader, James gear box and linkage modifications. This ORDALT changes the Mark and Mod of the loader to an Mk 2 Mod 13. ORDALT 9409 replaces the existing amplifiers with solid-state Mk 172 amplifiers.

ORDALT 9335 is accomplished at NOSL during loader overhaul. Installation of the loaders can be accomplished at the water front. The installation time in Mk 33 Mod 0 mounts is 100 man-hours. The installation procedure on an enclosed mount was proofed out at NOSL and required 300 man-hours. Installation procedures for both the Mod 0 and Mod 13 mounts will be provided to waterfront personnel in the form of an OD-type document that is now being produced.

ORDALT 9409 (Mk 172 amplifier) data package is now approximately 60% complete. The first article should be put together by October 1981, with production available in February 1982. The installation of the Mk 172 amplifiers is accomplished at the waterfront and requires approximately 48 man-hours.

Quality Assurance Program. NOSL Code 40 presented a summary of NOSL's Quality Assurance Program by highlighting and reviewing the applicable NAVSEA directives. This presentation covered the interpretation of project orders and work requests with regard to overhaul new manufacture of ordnance equipment by NOSL, production teardown to the level specified or as required for overhaul and evaluation of parts to determine the condition subsequent to disposition. Repair procedures are developed that detail description of material and work.

NAVSEA 62YG asked about the actual verification of configuration going out. NOSL Code 40 stated the configuration is given on the funding document

(project order/work request). NOSL Code 161 added that there is a standard attachment on the funding document which tells us, and then Quality Assurance Department verifies the configuration when the equipment is ready to be shipped. The Quality Assurance Department does the final "sign off" on equipment going out. NAVSEA 62YG asked about feedback on new equipment having problems. NOSL Code 161, said his office handles these problems on a case-by-case basis.

Computer Mk 47. NOSL Code 502 reviewed the problem that the Fleet had encountered in obtaining modules that are code 4N. The 4N items were either not available, had excessive lead times, or there was no response to the requisition. As a result of a meeting between NAVSEA, NSPCC and NOSL it was learned that the major problem was one of loss of item carcasses available to the supply system. To correct this deficiency NOSL developed a listing of critical carcasses, NAVSEA requested the users to turn in defective carcasses and NSPCC is to use the listing developed as a work base. Subsequent to this initial effort, 208 carcasses were received at NOSL. A NOSL generated request for funding to repair these carcasses has been submitted and is now being processed. With prompt receipt of funds, these refurbished modules should start returning to the fleet in 1981.

The majority of the returned carcasses were from ships, however 60 were returned from the Philadelphia Naval Shipyard alone. NSPCC has been requested to place these modules in the FIRM program. In addition to a lack of sufficient modules in the supply system to support the fleet, the Mk 47 computer is not in the GWSRP. The computers are repaired/upgraded/overhauled as the need arises. An estimate from NOSL to overhaul a Mk 47 computer was $400,000 if parts are available. Overhaul of the 208 carcasses that have been received requires utilizing modules from old and no longer used Mk 119 and Mk 118 computers for gears, shafts and other mechanical components, with NOSL overhauling/repairing the electronic part of the Mk 47 computer modules.

GWSRP Schedules . NOSL Code 161 provided a briefing on the monthly GWSRP schedules. The NAVSEACENPAC representative stated that Mare Island N.S.Y. required both Mk and Mod of elements in the GWSRP. It was found out that this information is provided in the monthly schedule, but that the distribution code for Mare Island was incorrect. NOSL Code 161 emphasized that once a piece of equipment has been shipped, then the following month it is dropped from the monthly schedule. The equipment listed in the out years section of the monthly report is for long range planning purposes.

Transportation of GWSRP Equipment. CDR Wells, NOSL Code 11 stated that quite frequently there are problems both from inside and outside the command. NOSL is required to interface with local railroads and have inspectors correct deficiencies before loading. If any repairs are required then NOSL does them before loading. Often between the place the railroad cars are loaded and their destination, the equipment gets damaged or it gets set aside. Because of the problems associated with the railroad, NOSL has started trucking the Mk 42 Mod 9 gun mounts. Approval has been granted to do this. This solves part of the problem only. The real problem is weight and getting permission to carry that kind of weight through the state. NOSL will continue

to pursue improvements to our current fleet of rail cars. NAVSEA suggested NOSL Code 11 contact NAVSEA 05M13 for assistance. NOSL Code 11 described the special features of the rail cars used by NOSL, i.e., special pads, special shipping fixtures which stay on the cars. Shipping messages are sent to receiving activities when equipment leaves NOSL, including pertinent data. Schedules also have the dates equipment left Louisville.

GWSRP Action Items. For ease of use, the Action Item Section is divided into three sub-sections:

Section A - Action items that are completed and closed-out

Section B - Action items that are not complete

Section C - New action items that were generated as a result of the latest GWSRP Conference

Action Items

Section A

Item No.	Item	Activity
S 79-4	Establish a procedure to ensure complete equipments are returned to the fleet.	NAVSEA 62YG

NAVSEA 62YG stated that the policy of the Gun Overhaul Program is to deliver complete equipment to the fleet. The ISEA will be tasked to develop a definition of complete equipments and to identify those items normally associated with equipment in the GWSRP. These guidelines will be used by the ISEA to determine what items should be in the equipment.

When an item leaves the depot a listing will be provided to the installing activity with a notation on missing items. A copy of this listing will also be provided to the appropriate NAVSEACEN and NAVSEA.

When an equipment is received at the depot a letter will be sent to the originating activity, NAVSEACEN and NAVSEA listing those items that were missing upon receipt of the equipment.

When a NAVSEACEN ships equipment to a depot for overhaul it will provide a letter to the depot and to NAVSEA listing those items that are missing.

When an installing activity or NAVSEACEN receives equipment it will provide a letter to NAVSEA and the depot listing what items are missing.

In all of the four circumstances listed above the LD that each activity is using to determine what equipments are missing will be referenced, along with any revisions.

A new action item was generated by NAVSEA 62YGD that requires NOSL Code 50 to develop an LD for use in determining required items in each GWSRP equipment.

Item No.	Item	Activity
S 79-7	Submit a draft ECP for stowage of lifting pads.	NOSL Code 50

There was a great amount of discussion centered around having and keeping lifting pads onboard ship. There was some discussion about making the lifting pads Title B equipment, inventorying at the Semi-annual level, making a ships allowance item or submitting an ECP that would eventually become an ORDALT. All of the suggestions were rejected for one reason or another and the decision was reached to complete a current study of lifting gear requirements, of which lifting pads are a part.

Item No.	Item	Activity
S 79-19	How do we restrict distribution of teflon to the shipyard level?	SPCC NOSL Rep. (J. Cain)

The item manager SPCC Code 3463 stated it would be handled on a case by case basis and it would only be issued to NAVSEACENS and shipyards.

Item No.	Item	Activity
F 79-20	Investigate oil recovery programs.	NAVSEA 62YG

NAVSEA 62YG stated that there will be a total of 10 low capacity units and three high capacity units purchased. The high capacity units will be sent to the NAVSEACENS and three lower capacity units sent to the Indian Ocean area. NAVSEACENPAC indicated that they are doing approximately 3 ships per month. A short discussion centered on the possibility of establishing a program where ordnance equipment hydraulic oil would be tested and cleaned at a certain periodicity or after a definite duration of operation. Investigation indicates this is not duplicative of other oil recovery programs and this action is herein closed out.

Item No.	Item	Activity
F 79-23	Provide list of commonly missing items on returned overhauled equipment.	CENPAC
F 79-26	Provide listing of commonly missing items on incoming equipment.	NOSL

NOTE: Items are F 79-23 and F 79-26 combined with item S 79-4 and are herein closed out.

Item No.	Item	Activity
F 79-29	Transition plan for single source funding.	SPCC

The transition plan from APA to NSF is currently onboard at NOSL and is under study. Single-source funding has occurred in FY-81.

Item No.	Item	Activity
S 80-1	Change cog on critical Mk 47 computer items.	SPCC NOSL Rep. (J. Cain)

NSPCC Code 3463 reported that the COG has been changed. Item herein closed out.

Item No.	Item	Activity
S 80-2	Inform CENPAC on status of Mk 45 fastener specifications.	NOSL Code 50

This item was covered in ISEA opening remarks and is herein closed out.

Item No.	Item	Activity
S 80-4	Provide listing to NSPCC (J. Cain) of Mk 42 Mod 7 items at Crane which need to be brought back to NOSL for overhaul.	NOSL Code 50

This item complete and herein closed out.

Item No.	Item	Activity
S 80-6	Investigate location of control panels in magazine area of Mk 75 gun mount.	NOSL Code 50

A SHIPALT is being prepared to accomplish this and this item is herein closed out.

Item No.	Item	Activity
S 80-8	Prepare a message for NAVSEA release outlining a method of combining POT&I and MCI.	CENLANT & CENPAC

This item separate from GSWRP and is herein closed out.

Section B

Item No.	Item	Activity
F 79-21	Provide spare parts support for the Mk 47 computer.	NAVSEA 62YG

This item was discussed in ISEA's opening remarks and is kept as an open action item pending further investigation and completion of funding and restoration of available carcasses.

Item No.	Item	Activity
S 80-3	Reprovisioning for the Mk 45 gun mount.	NAVSEA 62YG

Discussions are ongoing at NAVSEASYSCOM to determine actual problems in Mk 45 support. Further data will be provided at S-81 GWSRP conference.

Item No.	Item	Activity
S 80-5	Provide funding for overhaul of items listed in S 80-4.	NAVSEA 62YG

This item will be addressed by NAVSEA 62YG upon receipt of NOSL letter citing funding requirements. Specific details in ISEA opening remarks.

Item No.	Item	Activity
S 80-7	Investigate setting up "Gun Seminar" to be held first in the Norfolk area	NAVSEA 62YG

There has been considerable discussion on this item in recent weeks at NAVSEA. There is a possibility that NAVSEA can support a seminar held in the Norfolk area in the 3rd quarter of FY-81, similar to the fleet-sponsored SMS Conferences. If the details are worked out, the seminar envisioned would be conducted annually and would alternate between the East and West coast. Fleet response will be pursued and reported during S-81 GWSRP Conference.

Section C

Item No.	Item	Activity
F 80-1	Develop an LD for use in determining required items in GWSRP equipments.	NOSL 50

ATTENDEES

Name	Organization	Code	Phone No.
P. Asmus, CAPT, USN	NAVSEA	62Y	AV 222-1910
H. Walther, CAPT, USN	NAVSEA	06F	AV 222-1826
J. Froid, CAPT, USN	NAVSEA	014	AV 222-3820
J. Fleming, CDR, SC, USN	NAVSEA	62F	AV 222-0643
A. Romano	NAVSEA	62YG	AV 222-1910
S. Reading	NAVSEA	62YGD	AV 222-8896
R. Simoniz	NAVSEA	62YGG	AV 222-8897
A. Saline	NAVSEA	62YGV	AV 222-8896
H. Stein	NAVSEA	62M1	AV 222-9158
C. Cook	NAVSEA	0141	AV 222-1605
R. Harris	NAVSEA	0141	AV 222-1605
J. Monson, CDR, USN	CHNAVMAT	01G	AV 222-8566
J. Rogers	CHNAVMAT	0121	AV 222-8566
D. Wall	NOSIH	503	AV 364-4247
K. Songy	NOSIH	5033	AV 364-4455
R. Mack	NOSIH	5033A	AV 364-4455
G. Johnston	NOSIH	5033H	AV 364-4247
R. Dugan	NWS CONCORD	384	AV 253-5821
R. Uttich, LCDR, USN	CNSP	433	AV 958-9747
J. O'Brien	CNSL	4411	AV 690-5911
B. Clymer	SPCC REP/NWSC, CRANE	70	854-1875
C. Arney, Sr.	NWSC, CRANE	118	854-1623
G. Young	SPCC	3463	AV 430-2883
H. Madison	M.I.N.S.Y.	215	AV 253-2522
J. Plunkett	M.I.N.S.Y.	215	AV 253-2522
D. Riley	M.I.N.S.Y.	936	AV 253-3234
H. Clark	SUPSHIP PASCAGOULA	601	769-0258
C. Klabe	PERA, CRUDES	1850.2	AV 443-4312
F. Klem	PERA, CRUDES	1850.02	AV 443-4432
D. Harris	NAVSEACENLANTDET	91B	AV 961-7677
J. Uphan	NAVSEACENLANTDET	91	AV 961-7675
J. Hudson	NAVSEACENLANTDET	620	AV 961-7911
K. Fisher	NAVSEACENPACDET	200C	AV 957-4625
C. Westfall	NAVSEACENPACDET	200	AV 957-4625
D. Williams	NAVSEACENPACDET	91	AV 957-3535
D. Stewart, GMCM, USN	NAVSEACENPACDET	220	AV 957-4625
C. Carmichael, FTGC, USN	NAVSEACENPACDET	210	AV 957-4146
D. Shaw	NAVSEACENPACDET	922	AV 957-3577
S. Baldino	NAVSEACENPACDET	923	AV 957-3771
L. Meek	NAVSEACENPACDET PH	200P	808-474-2254
G. Young	NAVSEACENPACDET MI	90F	AV 253-2511

ATTENDEES (Continued)

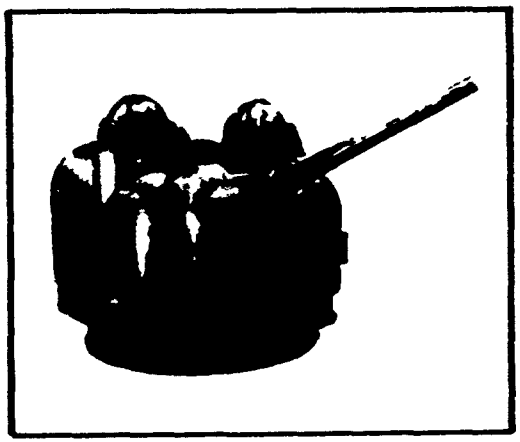
Name	Organization	Code	Phone No.
E. Cox	ARINC Research Corp.		301-266-4976
J. Pittenger	ARINC Research Corp.		301-266-4983
H. Neuhard, CDR, USN	NOSL	16	AV 989-5347
J. Keleher, CDR, USN	NOSL	02	AV 989-5630
T. Hand	NOSL	503	AV 989-5540
W. Ryan	NOSL	5013	AV 989-5628
T. Vormbrock	NOSL	5013	AV 989-5628
J. Moberly	NOSL	5013	AV 989-5628
W. Dill	NOSL	161	AV 989-5746
R. Caulfield	NOSL	5013	AV 989-5628
C. Turner	NOSL	161	AV 989-5831
B. Ensor	NOSL	502	AV 989-5424
B. Stewart	NOSL	502	AV 989-5424
P. Smith	NOSL	4012	AV 989-5544
J. Walters	NOSL	5013A	AV 989-5347
J. Reid	NOSL	50122	AV 984-5611
D. Crockett	NOSL	5012	AV 989-5301
J. Herb	NOSL	501	AV 989-5301
G. Grattan	NOSL	5013	AV 989-5347

APPENDIX D

SLIDE PRESENTATION FOR THE FALL 1980
GWSRP CONFERENCE

This appendix contains slides used in the presentation conducted by NAVSEA 62YG during the November 1980 GWSRP conference.

GWSRP CONFERENCE PROCESS



INDUCTION CONSIDERATIONS

- Ship Availability
- Equipment Inspections
- MDCS File
- Overhaul Costs
- Spares Availability
- Pipeline Assets
- PHST
- Equipment Configuration
- Remaining Life
- Fleet Requirements

PROGRAM CONSTRAINTS

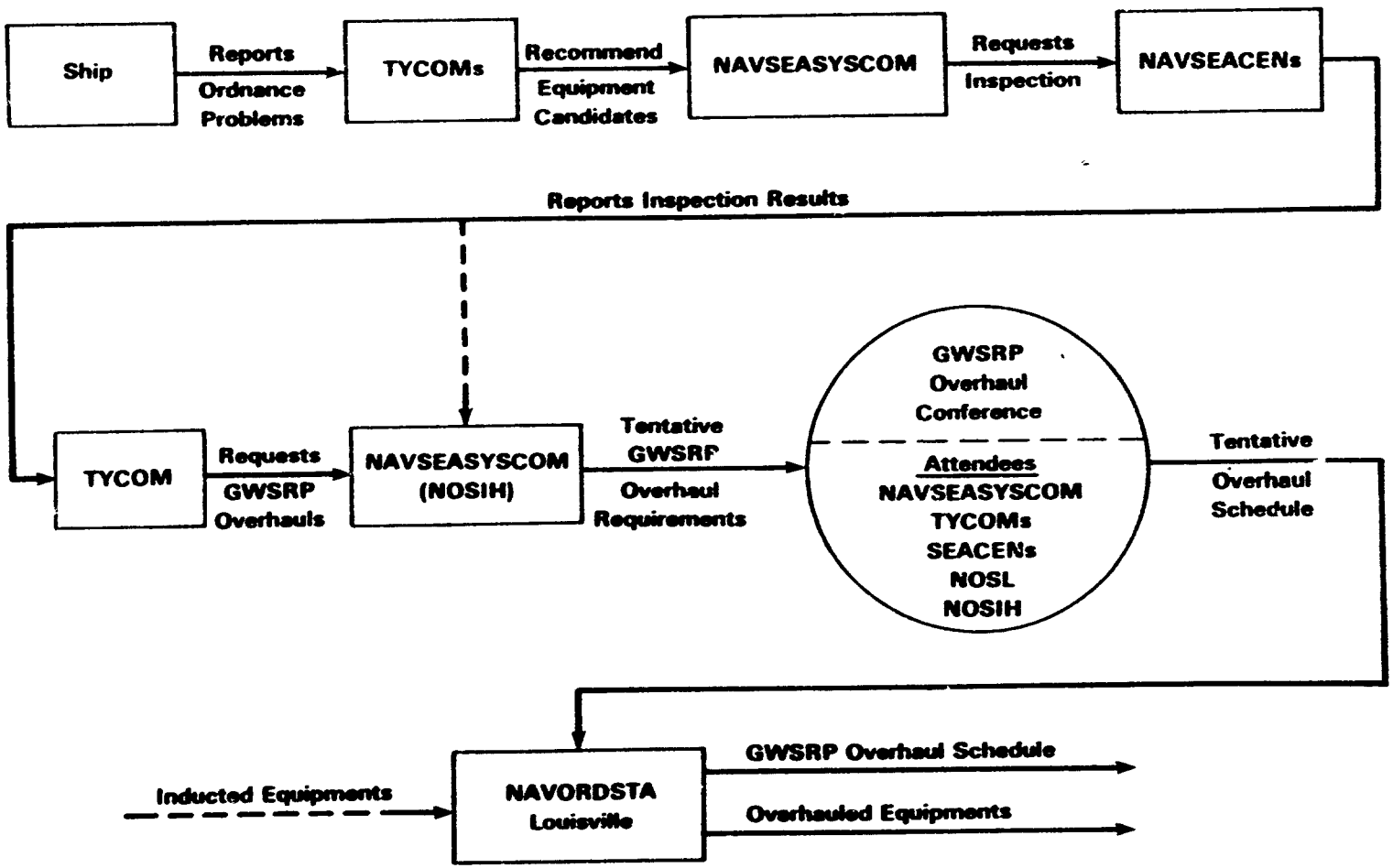
- Funding
- Industrial Capacity

CONFERENCE PRODUCTS

- Induction Schedule
- Delivery Schedule
- Out-Year Budget Planning Data
- Conference Minutes

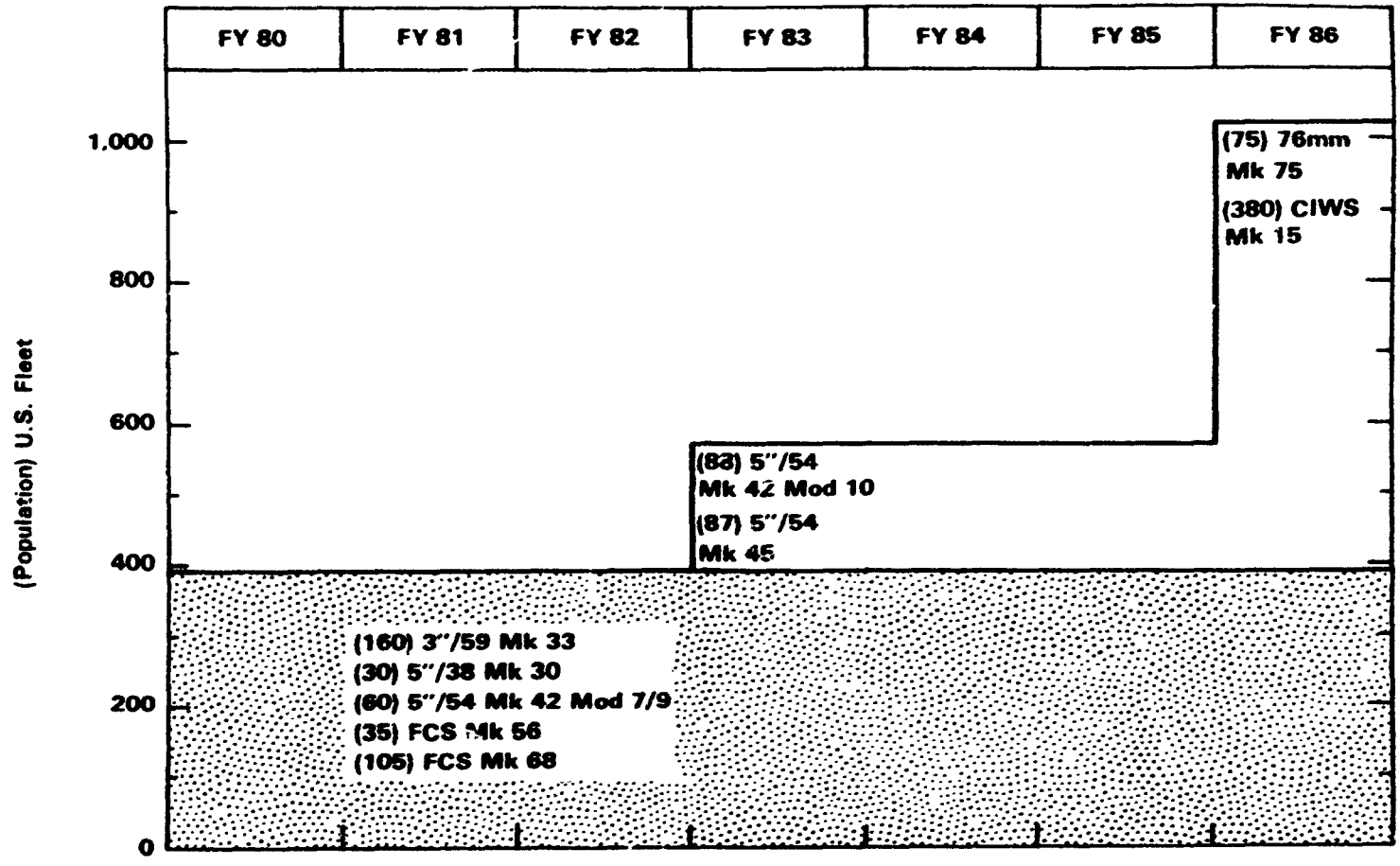
Slide No. 1

GWSRP EQUIPMENT INSPECTION AND INDUCTION PROCESS



Slide No. 2

GUN WEAPON SYSTEM REPLACEMENT PROGRAM, CURRENT AND FUTURE



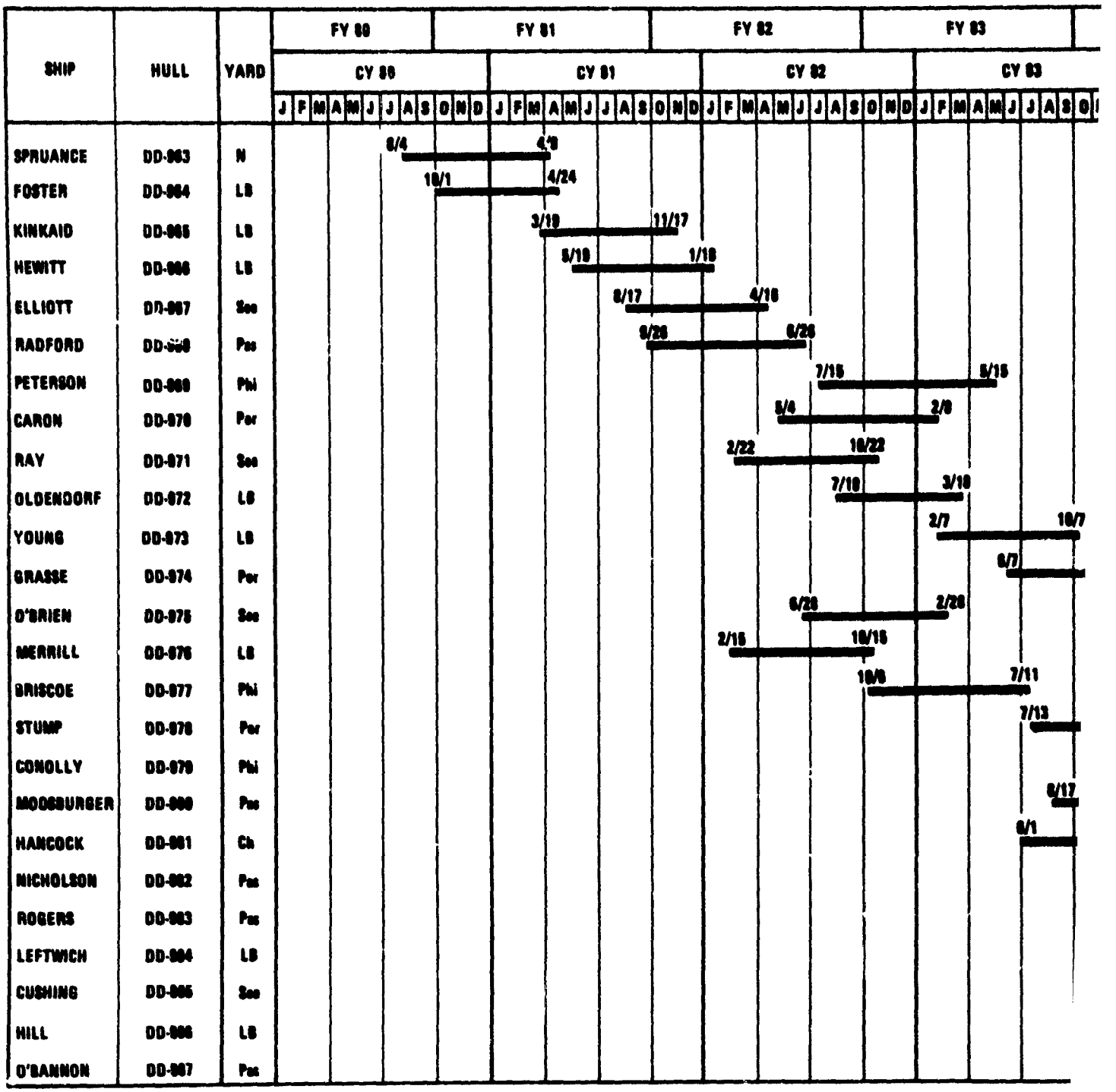
Slide No. 3

APPENDIX E

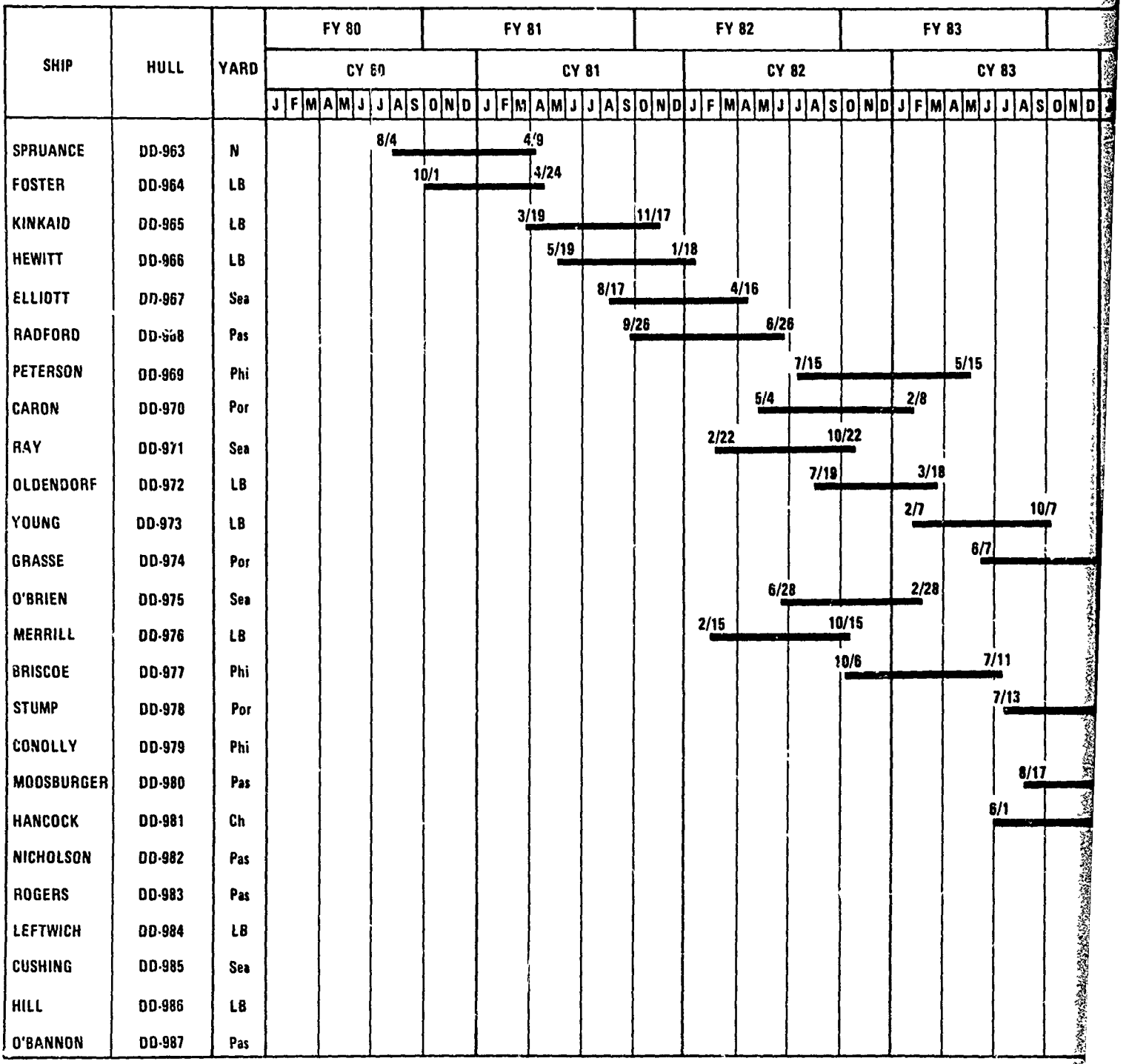
ROH SCHEDULE FOR SHIPS EQUIPPED WITH MK 45 GUN MOUNTS

This appendix presents the ROH schedule for FY 1980 through FY 1990 for ships equipped with Mk 45 gun mounts.

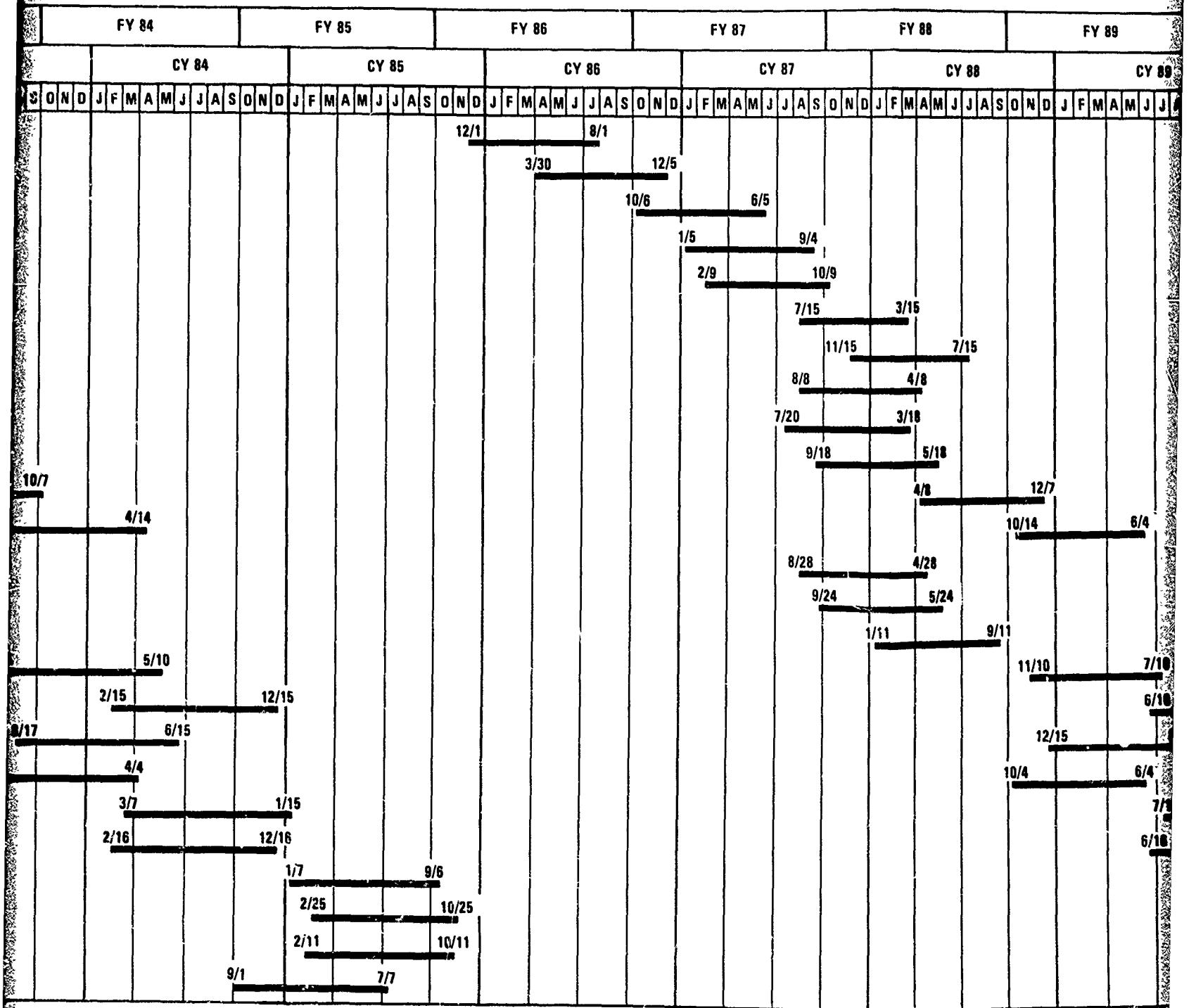
ROH SCHE


FY 80
FY 81
FY 82
FY 83
CY 80
CY 81
CY 82
CY 83
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O
SHIP
HULL
YARD
SPRUANCE DD-963 N 8/4 4/8
FOSTER DD-964 LB 10/1 4/24
KINKAID DD-965 LB 3/19 11/17
HEWITT DD-966 LB 8/19 1/18
ELLIOTT DD-967 Sea 8/17 4/16
RADFORD DD-968 Pas 9/26 8/26
PETERSON DD-969 Phi 7/15 5/15
CARON DD-970 Por 5/4 2/8
RAY DD-971 Sea 2/22 10/22
OLDENDORF DD-972 LB 7/18 3/18
YOUNG DD-973 LB 2/7 10/7
GRASSE DD-974 Por 8/7
O'BRIEN DD-975 Sea 8/28 2/28
MERRILL DD-976 LB 2/15 10/15
BRISCOE DD-977 Phi 10/6 7/11
STUMP DD-978 Por 7/13
CONOLLY DD-979 Phi
MOOSBRUGGER DD-980 Pas 8/17
HANCOCK DD-981 Ch 8/1
NICHOLSON DD-982 Pas
ROGERS DD-983 Pas
LEFTWICH DD-984 LB
CUSHING DD-985 Sea
HILL DD-986 LB
O'BANNON DD-987 Pas

ROH SCHEDU

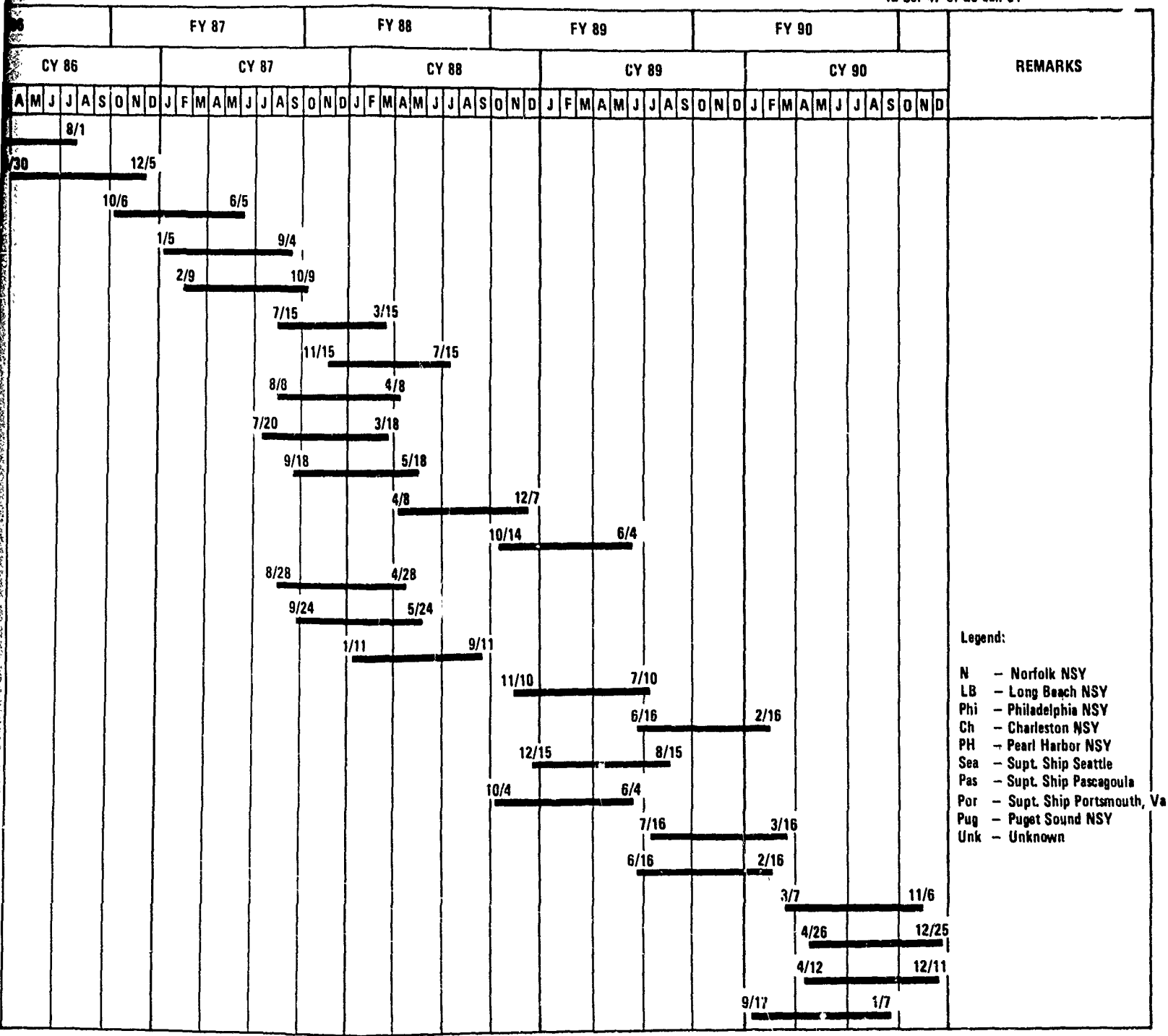

FY 80
FY 81
FY 82
FY 83
CY 80
CY 81
CY 82
CY 83
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J
SHIP
HULL
YARD
SPRUANCE DD-963 N 8/4 4/9
FOSTER DD-964 LB 10/1 3/24
KINKAID DD-965 LB 3/19 11/17
HEWITT DD-966 LB 5/19 1/18
ELLIOTT DD-967 Sea 8/17 4/16
RADFORD DD-968 Pas 9/26 6/26
PETERSON DD-969 Phi 7/15 5/15
CARON DD-970 Por 5/4 2/8
RAY DD-971 Sea 2/22 10/22
OLDENDORF DD-972 LB 7/19 3/18
YOUNG DD-973 LB 2/7 10/7
GRASSE DD-974 Por 6/7
O'BRIEN DD-975 Sea 6/28 2/28
MERRILL DD-976 LB 2/15 10/15
BRISCOE DD-977 Phi 10/6 7/11
STUMP DD-978 Por 7/13
CONOLLY DD-979 Phi
MOOSBURGER DD-980 Pas 8/17
HANCOCK DD-981 Ch 6/1
NICHOLSON DD-982 Pas
ROGERS DD-983 Pas
LEFTWICH DD-984 LB
CUSHING DD-985 Sea
HILL DD-986 LB
O'BANNON DD-987 Pas

HEDULE FOR SHIPS EQUIPPED WITH MK 45 GUN MOUNT



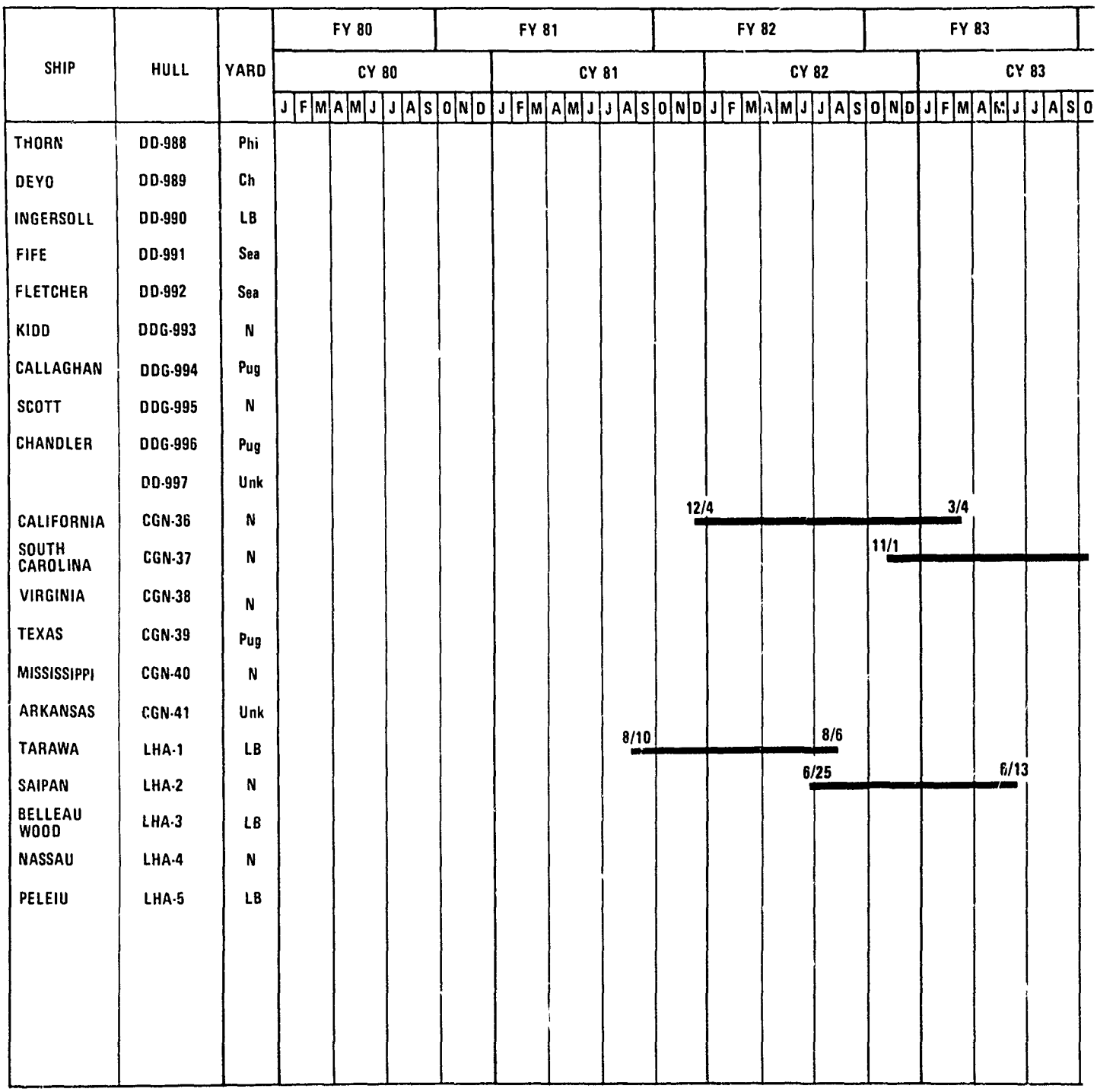
MK 45 GUN MOUNT

Based on Ships Overhaul Schedule SEA-0600-12 Ser 47 of 28 Jan 81

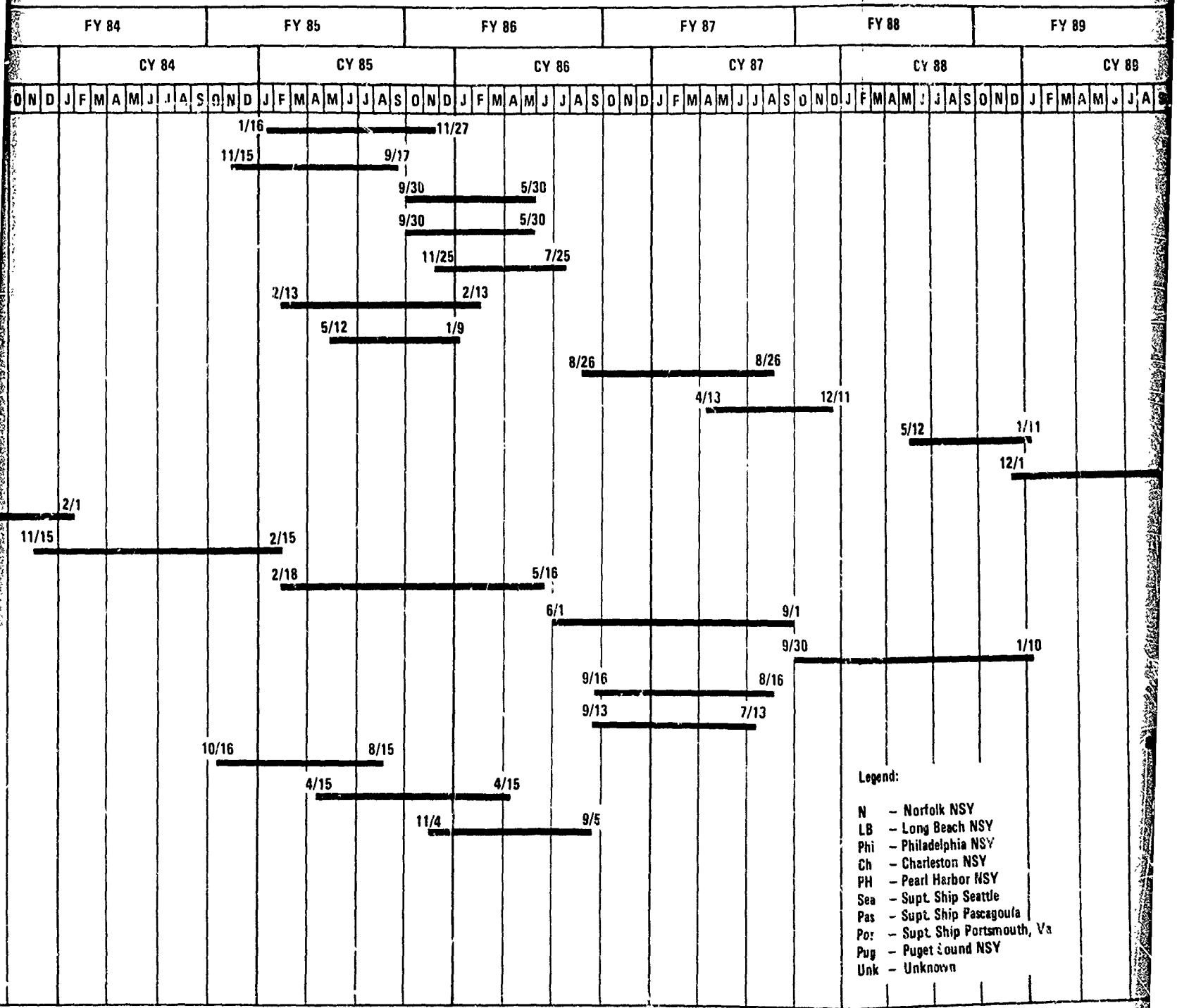


(continued)

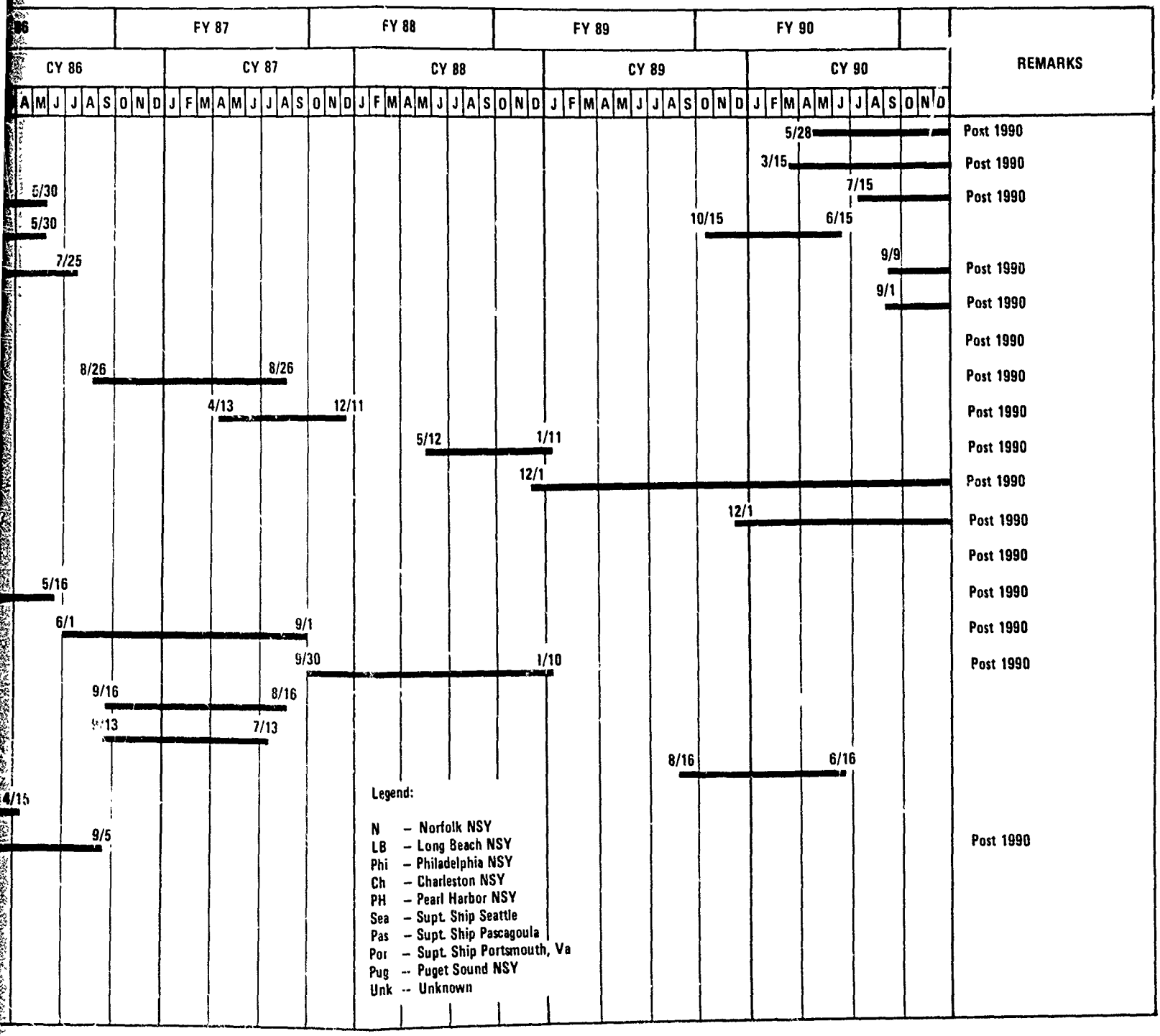
ROH SCHEDULE



E FOR SHIPS EQUIPPED WITH MK 45 GUN MOUNT (continued)



GUN MOUNT (continued)



APPENDIX F

STATUS OF NONEXPENDABLE ORDNANCE READINESS

This appendix displays an issue paper submitted to NAVSEA 62YG as required by NAVORDSTA, I.H., Code 5232. It compares actual vers.s funded requirements for Gun Weapon System overhauls from FY 1980 through FY 1982.

STATUS OF NON-EXPENDABLE ORDNANCE READINESS

TITLE: GUN WEAPON SYSTEMS MAJOR RESTORATION AND SUPPORT

OBJECTIVE: To improve Fleet readiness of selected combatant ship class Gun Weapon Systems by increasing the quantity of depot restorations of in-service armaments and availability of critical long-lead materials/assemblies.

DISCUSSION: Current Fleet demands are not being met for depot-restored (as new) systems and critical subassemblies because of maintenance funding shortfalls during the past three years, FY 78 through FY 80. In some cases, major assemblies are not being inducted into the refurbishment cycle until a specific Fleet combatant has reported an inability to carry out the mission to which assigned. Frequently, the force material offices cannibalize other units to provide deploying ships with operational equipment; often the cannibalizing action disrupts ongoing ship overhauls or causes premium procurement of replacement items. It invariably causes degradation to the cannibalized unit's ability to train personnel and perform total system testing. Generally, further "system" degradation can be anticipated on the cannibalized unit because power cannot be applied, piping has been disconnected, etc. This paper highlights the readiness deficiency of combat system in direct relationship to the expendable munitions readiness for FY 80 through FY 82. Attached matrices (TAB A) depict system overhaul requirements, current program, and deficiency by ship class and system.

ALTERNATIVES: It is recommended that O&MN funding necessary to accommodate improved readiness of in-service Gun Weapon Systems, as depicted in TAB A, be provided for FY 80, FY 81, and FY 82 requirements. By ship class, these requirements are as follows ($ thousands; current year).

READINESS DEFICIENCY TO EXISTING PROGRAM

	ALTERNATIVE 1			ALTERNATIVE 2	
	FY 80	FY 81	FY 82	FY 81	FY 82
CG			875		875
CGN			500		500
DD	1000	2000	3000	2500	3000
DDG		275	275	275	275
FF	1475	875	1150	875	1150

COMBATANT NON-EXPENDABLE ORDNANCE (GUN WEAPON SYSTEMS)

ALTERNATIVE 1

Ship Class(2)	Major System/ Critical Assembly	(1) Requirements FY 80 Qty	FY 80 $(3)	FY 81 Qty	FY 81 $(3)	FY 82 Qty	FY 82 $(3)	Current Program FY 80 Qty	FY 80 $(3)	FY 81 Qty	FY 81 $(3)	FY 82 Qty	FY 82 $(3)	Readiness Deficiency FY 80 Qty	FY 80 $(3)	FY 81 Qty	FY 81 $(3)	FY 82 Qty	FY 82 $(3)
CG-26	FCS Mk 68	-	-	-	-	1	275	-	-	-	-	-	-	-	-	-	-	1	275
	5"/54 Mk 42 Mod 10	-	-	-	-	1	600	-	-	-	-	-	-	-	-	-	-	1	600
CGN-36	FCS Mk 86	-	-	-	-	1	500	-	-	-	-	-	-	-	-	-	-	1	500
DD-963	FCS Mk 86	1	1000 (4)	4	2000	7	3500	-	-	-	-	-	500	1	1000	4	2000	7	3000
DDG-2/15/ 31/37	FCS Mk 68	1	275	3	825	3	825	1	275	2	550	2	550	-	-	1	275	1	275
	5"/54 Mk 42 Mod 10	-	-	-	-	1	600	-	-	-	-	1	600	-	-	-	-	-	-
FF-1052	FCS Mk 68	3	825	3	825	3	825	2	550	2	550	1	275	1	275	1	275	2	550
	5"/54 Mk 42 Mod 9	5	3000	4	2400	4	2400	3	1800	3	1800	3	1800	2	1200	1	600	1	600

REMARKS: (1) Requirements based on Fleet demands that are verified by NAVSEASYSCOM Material Inspection Program.
(2) Ship classes listed to permit assessment of $ cost to improve gun system readiness by ship class.
(3) $ in Thousands.
(4) Includes $500 start-up costs.

COMBATANT NON-EXPENDABLE ORDNANCE (GUN WEAPON SYSTEMS)

ALTERNATIVE 2

Ship (2) Class	Major System/ Critical Assembly	(1) Requirements FY 81 Qty	FY 81 $(3)	FY 82 Qty	FY 82 $(3)	Current Program FY 81 Qty	FY 81 $(3)	FY 82 Qty	FY 82 $(3)	Readiness Deficiency FY 81 Qty	FY 81 $(3)	FY 82 Qty	FY 82 $(3)
CG-26	FCS Mk 68	-	-	1	275	-	-	-	-	-	-	1	275
	5"/54 Mk 42 Mod 10	-	-	1	600	-	-	-	-	-	-	1	600
CGN-36	FCS Mk 86	-	-	1	500	-	-	-	-	-	-	1	500
DD-963	FCS Mk 86	4	2500(4)	7	3500	-	-	-	500	4	2500	7	3000
DDG-2/15/ 31/37	FCS Mk 68	3	825	3	825	2	550	2	550	1	275	1	275
	5"/54 Mk 42 Mod 10	-	-	1	600	-	-	1	600	-	-	-	-
FF-1052	FCS Mk 68	3	825	3	825	2	550	1	275	1	275	2	550
	5"/54 Mk 42 Mod 9	4	2400	4	2400	3	1800	3	1800	1	600	1	600

REMARKS: (1) Requirements based on Fleet demands that are verified by NAVSEASYSCOM Material Inspection Program.
(2) Ship classes listed to permit assessment of $ cost to improve gun system readiness by ship class.
(3) $ in Thousands.
(4) Includes $500 start-up costs.

APPENDIX G

ABBREVIATIONS AND ACRONYMS

AAW	Antiair Warfare
AE	Ammunition Ship
AFS	Combat Store Ship
AOE	Fast Combat Support Ship
AOR	Replenishment Oiler
AS	Submarine Tender
CD (or CRUDES)	Cruisers/Destroyers
CG	Guided Missile Cruiser
CGN	Guided Missile Cruiser (Nuclear)
CIWS	Close-In Weapon System
CNO	Chief of Naval Operations
CV	Aircraft Carrier
CVN	Aircraft Carrier (Nuclear)
DD	Destroyer
DDG	Guided Missile Destroyer
DOP	Designated Overhaul Point
FF	Frigate
FFG	Guided Missile Frigate
FY	Fiscal Year
GFCS	Gun Fire Control System
GRS	GWSIP Reporting System
GWS	Gun Weapon System
GWSIP	Gun Weapon System Improvement Program
GWSRP	Gun Weapon Systems Replacement Program

LCC	Amphibious Command Ship
LHA	Amphibious Assault Ship
LKA	Amphibious Cargo Ship
LPD	Amphibious Transport Dock
LPH	Amphibious Assault Ship
LSD	Landing Ship Dock
LST	Landing Ship Tank
MCR	Material Condition Review
MH	Man-Hour
Mk	Mark
MM	Millimeter
Mod	Modification
MODEM	Modulator/Demodulator
NAVORD	Naval Ordnance
NAVORDSTA	Naval Ordnance Station
NAVORDSTA, I.H.	Naval Ordnance Station, Indian Head
NAVORDSTALOU	Naval Ordnance Station, Louisville
NAVSEACENDET	Naval Sea Support Center Detachment
NAVSEACENLANTDET	Naval Sea Support Center Detachment, Atlantic
NAVSEACENPACDET	Naval Sea Support Center Detachment, Pacific
NAVSEASYSCOM	Naval Sea Systems Command
NDT	Nondestructive Testing
NSY	Naval Shipyard
OP	Ordnance Publication
OPNAV	Office of the Chief of Naval Operations
ORDALT	Ordnance Alteration
PERA	Planning and Engineering for Repairs and Alterations
PHM	Patrol Combatant Missile (Hydrofoil)
PMP	Preliminary Management Plan
POT&I	Pre-Overhaul Test and Inspection
ROH	Regular Overhaul

SECAS	Ship's Equipment Configuration Accounting System
SIMA	Shore Intermediate Maintenance Activity
SUPSHIP	Supervisor of Shipbuilding, Conversion, and Repair
SUW	Surface Warfare
TDT	Target Designation Transmitter
TYCOM	Type Commander
WBS	Work Breakdown Structure
WQEC	Weapons Quality Evaluation Center